# The Chemical Age

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*NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.*

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## The Dyestuffs Report

FROM one point of view, it is a distinct triumph for the Dyestuffs Development Committee to have produced a comprehensive report on the working of the Act during the past ten years to which all the members of the Committee have been able to subscribe. That this unanimity has been secured at some sacrifice is clear from the almost non-committal terms with which the report concludes. Several members of the Committee, it may be safely assumed, were in favour of the continuance of the Act, at least in some modified form, for a further period. Several, also, must have favoured the expiration of the Act at the end of the period originally agreed upon, that is, "ten years and no longer." Neither view is expressed in the Committee's conclusions. The nearest approach to a definite recommendation is the statement that it is to the interest of all parties concerned—the Government, the users and the dyestuffs manufacturers—to continue to consider the problem in the same spirit of co-operation that has marked the period of operation of the Dyestuffs Act. Further, they are urged to agree if possible, first, whether any further assistance to the industry is necessary, and, if so, as to the form which such assistance should take.

The report, therefore, so far as its actual conclusions go, does not clear the way for the future. It places upon the three interests named the onus of deciding between themselves, to put the point plainly, whether the Dyestuffs Act should be continued at all, and if so for what period and under what modifications. It is understood that the Government through the Board of Trade are already acting on this suggestion and before long an announcement must be made as to what decision they have reached. One suggestion, which we believe commands a certain amount of support, is that the industry should agree to the abolition of the price factor, which would mean unprotected competition with world prices, but that the Act, with the right of supervision of imports, should still be continued. It might reasonably be asked, if the present restrictions on imports are abolished, what purpose the Dyestuffs Act could still serve and what function would remain for a licensing committee? One answer would be that although the necessity for obtaining licences to import foreign colours would disappear, the Act would still be in the background as a guarantee against dumping. The German dyestuffs manufacturers have not only achieved great technical efficiency but have backed it up by extremely shrewd business methods. By supplying the wants of British colour users at prices deliberately lower than those of British manufacturers they might succeed in destroying the results which have already been secured. Having done that and got the market in their hands, they might then reap the reward by charging users what prices they thought fit.

The users to-day flatter themselves that they are back in the pre-war period with no fear of again having their supplies cut off as they were during the war. But the essential object in establishing a national dyestuffs industry was to safeguard the country and the textile industry from a repetition of the conditions of 1914 and the users, who are now prepared to ignore that essential condition, to say nothing of what an efficient dyestuffs industry means to the future of organic chemistry, may realise for a second time how short-sighted and disastrous their policy has been.

While the conclusions of the Committee are almost entirely non-committal, the value of the report consists in its carefully compiled history and facts of the past ten years. Generally speaking, the report makes it clear that the main object of the Act has been achieved and that a substantial dyemaking industry has been built up and maintained by reason of the Act in this country. That is a very temperate statement of what the British dyestuffs makers have achieved in a comparatively short period. When this period comes to be looked back upon from a distance, the chemical and industrial results of the past ten years will be regarded as among the most remarkable in the history of British chemistry and technology.

While making this point quite clear, the report is

distinguished by surprising frankness in its acknowledgment of incidental disadvantages and defects which are almost inevitable in such a large experiment. There are several minor directions in which the policy of the makers is critically mentioned. It is acknowledged quite freely that the results have been obtained at considerable sacrifice on the part of British users. In particular, it is pointed out that in a matter of "novelties" the British makers are not yet able to supply the needs of British users who are considerably handicapped by the present licensing system. This, indeed, seems to us the strongest ground of complaint that the users are able to put forward and it is one that it ought to be possible to meet in some way by the co-operation of all the parties concerned.

Summing up the situation, then, it comes roughly to this: First, that the Dyestuffs Act, having in view the object for which it was passed, has been successful beyond all expectations. Secondly, that its working has been accompanied by inevitable defects and disadvantages in practice. Thirdly, that the vital problem to be considered is whether the industry is now strong enough to stand absolutely alone or still needs further modified protection for a further period of years. Such details as prices and novelties ought not to be allowed entirely to dominate the situation. As we believe Professor Armstrong has put it—"Full support of the dyestuffs industry is essential because it is our highest school of constructive chemistry on the organic side. If we lose it we inevitably lose our place in chemistry." These are wise words to which all who look to the future will do well to give full weight.

## The Chemical Research "Lab."

PROFESSOR G. T. MORGAN'S presidential address to the Chemistry Section of the British Association gives a very complete and judicial account of the work of the chemical research laboratory at Teddington, of which he has had charge since its establishment. From time to time papers have been presented on special researches conducted by the staff, and without exception these have excited great interest and appreciation. The present address covers the whole ground in a convenient form, and it is supplemented at Bristol by a most valuable and interesting collection of laboratory products, "for," as Professor Morgan observes, "these specimens, diagrams, models and photographs furnish a record of the researches of this youthful organisation which is far more realistic and appealing than any words of mine."

Professor Morgan speaks throughout as historian rather than as advocate, but he brings out two important points in justification of this experiment in State research—first, the scientific and industrial importance of the researches completed and in progress; secondly, the significant fact that of the sixteen members of the laboratory staff who have resigned during the five years, fourteen have gone into chemical industry to occupy positions of considerable importance and responsibility. Those who really know anything of the work of the laboratory will be disposed to congratulate Dr. Morgan and his staff on the sound policy adopted by them at the outset and on the excellent work they have already succeeded in doing.

## A Change of Chairmanship

A CHANGE in the chairmanship of the British Chemical Plant Manufacturers' Association, although a periodical incident, is too important to be allowed to pass wholly without comment. Mr J. Arthur Reavell, of the Kestner Evaporator and Engineering Co., has just retired from the position after holding it for a period of three strenuous years. During that time, the membership—and with the membership the influence—of the Association has materially increased, the whole outlook of British chemical plant manufacturers has widened, and new heart has been put into the members when some of them were in danger of becoming discouraged by foreign competition. This subject of foreign plant was boldly tackled after one of the annual dinners, and the discussion proved one of the most profitable of the kind ever organised. Mr. Reavell may look back on his three years of office with complete satisfaction, and the Association, while acknowledging the value of his services and infectious enthusiasm, will feel fortunate in having secured so capable a successor as Dr. Bush, of the firm of Huntington, Heberlein and Co. Dr. Bush brings to the office a wide business experience allied with high technical and scientific qualifications, and under his chairmanship the Association may confidently look forward to the maintenance and even expansion of the good work accomplished during his predecessor's terms of office.

### Books Received

ARTIFICIAL ORGANIC PIGMENTS AND THEIR APPLICATIONS. By Dr. C. A. Curtis (translated from the German by Ernest Fyleman). London: Sir Isaac Pitman and Sons. Pp. 290. 21s.

RECENT ADVANCES IN ANALYTICAL CHEMISTRY. By C. Ainsworth Mitchell. London: J. and A. Churchill. Pp. 421. 12s. 6d.

UNEMPLOYED OR RESERVE? By Mrs. M. A. Cloudesley Brereton. London: Knapp, Drewett & Sons, London. Pp. 31.

QUANTITATIVE ORGANIC MICROANALYSIS. By Fritz Pregl. London: J. and A. Churchill. Pp. 237. 15s.

## The Calendar

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| Sep. 3–10 | British Association for the Advancement of Science<br>Sept 8—Discussion on "Chemotherapy," Dr. F. Pyman, Professor G. Barger, Dr. A. J. Ewins, Dr. H. King, Dr. T. A. Henry, Professor R. Robinson, Professor C. S. Gibson, Professor E. C. C. Baly.<br>Sept. 9—"New Experimental Methods for the Study of Gas Reactions," Professor M. W. Travers, "The Initiation of Combustion," Professor N. Semenoff. "Some Organic Compounds of Thallium," Dr. R. C. Menzies. "The Effect of the Solvent on Reaction Velocity," Dr. F. G. Soper. | Bristol. |
| 15–20 | Iron and Steel Institute: Autumn Meeting. | Czechoslovakia. |
| Sep. 22, 23 and 24 | Ceramic Society. Joint Meeting of the Refractory Materials Section and Building Materials Section. 2.30 p.m. | Building Trades Exhibition, Olympia, London. |
| Sep. 29 to Oct. 1 | Faraday Society: General Discussion: "Colloid Science Applied to Biology." | The Laboratory of Physical Chemistry, Free School Lane, Cambridge. |
| 6 | Iron and Steel Institute: Additional Autumn Meeting. 7.30 p.m. | Cleveland Technical Institute, Middlesbrough. |

# A State Experiment in Chemical Research

## By Professor G. T. Morgan

*Professor G. T. Morgan, D.Sc., F.R.S., the President of the Chemistry Section at the British Association meetings at Bristol, chose as the subject of his opening presidential address on Thursday, "A State Experiment in Chemical Research." He described the organisation and work of the Chemical Research Laboratory at Teddington, of which he has had charge since its establishment, and concluded with some general observations on the subject of chemical research.*

In reviewing the history of the project Professor Morgan stated that the work of the Department of Scientific and Industrial Research began in 1915, and during the ensuing ten years the Department had at various times become interested in investigations of a chemical nature, such, for example, as (1) large-scale researches on the chlorination of methane, (2) large-scale researches on the production of formaldehyde, (3) investigations on the production of glycerine, (4) investigations on the manufacture of chemical products from fish residues, (5) general researches on the corrosion of metals, (6) general researches on high-pressure reactions, including the reactions between carbon monoxide and hydrogen. These investigations, which were undertaken mainly under the auspices of the Chemistry Co-ordinating Research Board, were carried out by isolated groups of workers, who were often located in widely separated laboratories. It soon became evident that some increase in economy and efficiency could be attained by bringing together under one roof these scattered groups of workers who would receive encouragement and stimulus by becoming part of a more centralised scientific organisation. A suitable site was chosen on the Bushey Park Estate in close proximity to the National Physical Laboratory and the Admiralty Research Laboratory, and here in 1924 the building of a chemical laboratory was commenced on a plot of land allowing ample scope for future expansion. The construction of one unit was started towards the end of 1924, and when scientific work was commenced in the autumn of 1925 about one-third of the first unit had been built, although actually only one room was ready for occupation. The fitting of the remaining laboratories and workshop was, however, rapidly effected, and by the end of 1926 the whole of the available space was fully occupied, the staff then consisting of the superintendent and ten chemists, with one engineering assistant and ten members of the artisan, clerical and general staff.

### Mandated Researches

At the present time the scientific and technical staffs are occupied on six specific items of research prescribed on the advice of the Chemistry Research Board, and "working parties of exploration" are detailed to these mandated researches by the Director. The six mandated researches are as follows: Synthetic resins, low-temperature tar, high-pressure chemistry, corrosion of metals, chemotherapy, and research on water pollution. In addition, a certain amount of general research is carried out at the discretion of the Director.

After a detailed description of the researches of the results obtained in these fields, Professor Morgan passed on to some general observations. The mainstay, he said, of the foregoing investigations are the well-equipped workshops manned by five skilled artisans who are engaged on the production and maintenance of the appliances and plant required in the various research programmes. Appliances for high-pressure chemistry are a speciality of the laboratory workshops, and such plant includes bombs and pre-heaters for flow-through experiments with gaseous reagents, and autoclaves of various types for reactions with gases, liquids and solids. The researches on tar products call for automatic extractors, filter plant and stills for either ordinary or diminished pressures.

### The State Laboratory and the Scientific Public

The twofold primary aim of any State research laboratory should be the collection and dispersal of scientific knowledge and information. For the former function of collection and discovery of new knowledge the exploring parties foreseen by Professor Vernon Harcourt should supply an adequate means providing that each group proceeds under enlightened and inspired leadership. But for the complementary function of dispersal of information a chemical laboratory must depend largely on such well-established media of publication as the journals of the leading chemical societies. It is my personal opinion that this mode of dispersing chemical knowledge should have priority over its publication in official governmental reports. First, because in this way the information radiates more rapidly to a wider public; secondly, because this form of publication is frequently preceded by a reading and discussion of the subject-matter at a scientific meeting; and lastly, because the financial circumstances of the learned societies compel them to impose a limit on the length of communications which is conducive to brevity and conciseness.

### Relations with Other Scientific Institutions

Apart from substances of therapeutic interest prepared for the Committee on Chemotherapy, numerous other research materials have been distributed to colleagues in the universities and research institutions. Compressed helium and carbon monoxide have been rendered available for scientific workers requiring these gases. Organic derivatives of tellurium have been lent to the Cambridge University Chemical Laboratory for the purpose of physico-chemical measurements, and to the Birkbeck College for the demonstration of the parachor of this element. Compounds of special chemical interest have been supplied to the Davy Faraday Laboratory and to the National Physical Laboratory for the X-ray study of their crystal structure. It is a pleasant duty to refer to the aid received from the Government Laboratory in respect of micro-analyses and in connection with the work on synthetic resins.

Reference has already been made to the close collaboration of the laboratory with H.M. Fuel Research Station in regard to the products of coal carbonisation. Certain preparations from low temperature tar have been submitted to the Cotton and Woollen Research Associations for examination in connection with the chemical treatment of textile fibres.

### Relations with Chemical Industry

The associations of the laboratory with chemical industry have always been cordial and are daily becoming increasingly intimate. Prominent industrialists either individually or in their corporate capacity as members of the Association of British Chemical Manufacturers and allied organisations have visited the laboratory and sometimes repeatedly.

Arising out of these visits and informal conferences, more than a hundred samples of the research products of the laboratory have been distributed to interested inquirers.

Members of the scientific staff participate in the work of the Committee for the Standardisation of Tar Products Tests, the Bureau of Chemical Abstracts, the Corrosion Committee of the Iron and Steel Institute, and the Council and various Committees of the Society of Chemical Industry.

Although the laboratory is not a teaching institution in the academic sense of the term, yet facilities have been afforded for collaboration in research to chemists in training of approved qualifications. The two leading metropolitan gas companies have seconded to the laboratory for this purpose junior members of their scientific staffs who have worked at Teddington for periods ranging from six to eighteen months. The subjects so far selected for this collaboration have been high-pressure chemistry and low-temperature tar.

In the foregoing description of the activities of the new laboratory I have endeavoured to speak as historian rather than as advocate, but if any justification is to be included I would take as the two leading points of my case: first, the scientific and industrial importance of the researches completed and in progress; secondly, the significant fact that of the sixteen members of the laboratory staff who have resigned during the five years, fourteen have gone into chemical industry to occupy positions of considerable importance and responsibility. The appreciation of chemical talent is a valuable function of this State laboratory.

Those who feel sufficiently interested in the realisation of Professor Vernon Harcourt's vision should not fail to visit the exhibit of laboratory products now on view in an adjacent

room, for these specimens, diagrams, models and photographs furnish a record of the researches of this youthful organisation which is far more realistic and appealing than any words of mine can be. Certain of these investigations have an immediate practical objective; others represent the long view. It is, however, impossible to draw a definite distinction between these contrasted types. The aim of a State laboratory should rather be to encourage a judicious blend of the two.

The chemical preparations now selected for exhibition as representing the work of the first five years are only the more distinctive specimens of a much larger collection which is continually being accumulated and classified. In a similar orderly manner chemical knowledge is being collected and systematised in the files and card-indexes compiled by members of each exploring party. So soon as any particular research is sufficiently complete it is contributed to the appropriate learned society. Occasionally publication takes the form of patent specifications. By such concerted efforts the laboratory must come to be recognised as a storehouse of chemical information at least for those branches of the science which are included in the scope of its researches. Is it desirable that this scope should be extended, and if so, in what directions? This is not the occasion to discuss matters of departmental policy, but, in my present capacity, I may, like my predecessor of fifty-five years ago, indulge in anticipations of how future developments might be of advantage to chemical science in general and to British chemistry in particular.

### Inorganic and Mineral Chemistry

An eminent authority has recently enquired what has become of inorganic chemistry, and this question is frequently repeated. The present answer is that, so far as this country is concerned, the subject is no longer investigated systematically. British chemists are now for the most part content to leave this work of exploration to their contemporaries in other lands. Yet the British Empire is endowed with mineral resources to an extent unsurpassed by any other nation or empire under the sun. In can scarcely be contended that in this respect we are rendering an adequate account of our stewardship. Although there are a few meritorious exceptions, one may say broadly that there is no sustained British attempt to study the rare earths, the less common alkalis, or the metals of the platinum group. Such chemical curiosities as beryllium, gallium, germanium, indium and thallium rarely excite the scientific interest of our investigators. Yet the chemical study of the less common elements, and especially of those grouped under the disparaging term of "minor metals," is a matter of considerable scientific importance and one which sooner rather than later is likely to yield results of industrial value. If proof of this statement is needed, reference may be made to the inert gases which were first noticed in 1894 and subsequently found by Ramsay and Travers to be five in number. To-day three of these gases are employed industrially.

I have already mentioned low-temperature tar, which is literally a burning question. The great German combination of chemical factories—the Interessen Gemeinschaft—have recently filed patents describing the catalytic effect of molybdic acid on the hydrogenation under pressure of this intractable material. They claim a clear volatile product obtainable in good yield and suitable for motor fuel. Further investigation shows that this beneficial catalytic influence is peculiar to molybdenum compounds and is not possessed by analogous compounds of the other metals of the sixth periodic family. It certainly pays to study chemically the idiosyncrasies of the rarer elements and their derivatives.

### The Organic Chemistry of Vital Products

At the Bristol meeting of 1898, Professor F. R. Japp's presidential address to this section dealt with the subjects of stereochemistry and vitalism. He called attention to Nature's method of preparing single optically active substances, and referred to the insufficiency of the mechanical explanation of vitalistic phenomena.

Considerable advances have since been made in our knowledge of the fundamental processes of photosynthesis, notably as the result of suggestive discoveries by Professor Baly and his collaborators, but nevertheless we still have much to learn from Nature in regard to the synthesis of carbon compounds. This study of the products of the vital activities of animal and vegetable organisms was the original province of organic chemistry, and to this circumstance the science owes its distinctive name. During the last eighty years, however, organic chemists have extended the scope of enquiry to many substances which are produced not as the result of vital forces, but through the agency of the laboratory arts.

For instance, the organometallic compounds, which have no counterparts in nature, have received intensive study because of their influence on the development of modern chemical theory, their practical application in many operations of organic synthesis and their utilisation as drugs, weapons of chemical warfare and antidetonants. No objection can be urged against the continued investigation of such important artificial products providing that naturally occurring organic materials are not overlooked.

### Research on Dominion Products

Professor Japp's address supplies the philosophic reason for a closer study of the products of vital activity, and at present other more mundane considerations may be adduced in support of such researches. Political and economic forces are bringing into prominence the urgency for a mutually advantageous interchange of commodities between the constituent nations and colonies of the British Empire, and in this pooling of natural resources organic chemistry must play an essential part. Many of the natural products of the dominions and dependencies are in need of systematic chemical study.

Animal and vegetable fats have been mentioned by an investigator in that field as constituting a neglected chapter of organic chemistry, but the phrase is at least as applicable to many other groups of organic substances, for example: the essential oils, the natural gums and resins, and the numerous products of fermentation processes. By catalytic reductions, involving high temperatures and pressures, one obtains from the oxides of carbon many members of the homologous series of alcohols, aldehydes, fatty acids and esters. Plant life accomplishes similar results under ordinary atmospheric conditions. A comparative study of these two dissimilar sets of processes is clearly demanded.

The importance of imparting to organic chemistry an increasingly biological bias has been illustrated in a convincing manner by my immediate predecessor, Professor Barger, so that anything more than a passing reference to this desirable tendency is hardly required of me. Perhaps, however, I should add that in stressing the need of more systematic research in organic and mineral chemistry and in the organic chemistry of vital products, I am convinced that the best results will only be attained if the problems are attacked with the newest weapons which the armoury of modern physics can provide.

The primary object of such investigations is the collection of accurate chemical information, but the workers in these two great fields should be stimulated in every possible way to keep a shrewd look-out for any practical applications of their scientific knowledge. When viewed from this standpoint it will be realised that a State experiment in chemical research such as I have described provides competent and enterprising investigators with favourable opportunities for developing their inventive talent in fundamental work of national value and importance.

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### Sir John Cass Technical Institute

THE new session of the Sir John Cass Technical Institute, Jewry Street, Aldgate, London, E.C., which extends over about 36 weeks, will begin on Monday, September 22, and students will be enrolled during the preceding week. The Institute provides instruction in pure and applied mathematics, physics, chemistry, botany, zoology, bio-chemistry of fermentation (including malting and brewing), petroleum technology, fuel technology (including coal carbonisation and gas manufacture), metallurgy, assaying, geology, modern languages and arts and crafts.

The science courses are arranged to meet the requirements of those engaged in chemical, metallurgical, electrical, petroleum and fermentation industries, and are held from 6 to 10 p.m. Full facilities are provided in well-equipped laboratories for special investigations and research. The instruction in experimental science also provides systematic courses for the examinations of London University, the Institute of Chemistry, and the Institute of Brewing.

## British Road Tar Association

### Appointment of New Chairman

MR. REGINALD G. CLARRY, ex-M.P. for the Newport division of Monmouthshire, has been appointed Chairman of the British Road Tar Association, whose offices are at 17, Grosvenor Gardens, London. Mr. Clarry, who was born in Derby, was trained in civil engineering and chemistry, and had an active and successful business career before taking up politics. During the war he was honorary adviser to the High Explosives Department of the Ministry of Munitions, and later took complete control of the Duffryn Steel and Tinplate Works, Morriston, Glam., where 100,000 tons of coal per annum were used as fuel. He was one of the earliest to recognise the extremely valuable products of coal in by-product recovery coke ovens, and has always appreciated the great potentialities of coal tar whether treated in gas works or coke ovens.

MR. R. G. CLARRY

It was in 1922 that he stood for the Newport division of Monmouthshire. Standing as an independent Conservative in a constituency that had always been Liberal, and against both Coalition and Socialist candidates, his prospects appeared hopeless, yet he won the seat by a substantial majority. It was within a few hours of this victory that the Coalition Government collapsed. In the three general elections which followed in quick succession Mr. Clarry was equally successful, so that he has fought and won four Parliamentary contests in two years. He held the seat until the general election of last year.

The appointment of Mr. Clarry to this new post may be regarded as significant of the growing importance of the British Road Tar Association. Originally founded in 1925, it now has a membership of some 710 firms in the gas, coke-oven, and tar distilling industries, which between them treat 35,000,000 tons of coal a year, producing 2,000,000 tons of crude tar and employing nearly 200,000 workpeople. The Association seeks to enlarge the market for British tar, and especially to encourage the use of British tar on British roads. As a direct result of the suggestions it put forward, the official Road Board specifications for the different grades of tar have lately been tightened up. At the same time the Association is continuing to obtain even greater uniformity in quality.

While the Association has confined its research work to the laying of experimental stretches of road in different parts of the country, it has established close relations with the various organisations and Government departments interested in road building, and has kept a careful record of all new developments. By means of the facilities which it provides the latest technical information and advice on all questions relating to the tar treatment of roads is now available to road authorities, not only in this country but throughout the world.

## Olive Oil as Motor Lubricant

### Spanish Project for Developing Home Industry

ACCORDING to a Madrid report, attempts are being made in Spain to popularise the use of native olive oil as a lubricant for motor-cars and internal combustion engines. Many technical difficulties have been overcome. The chemical processes involved in converting the edible product into a suitable lubricant result in a loss of about 30 per cent. in weight, but it has been found that a satisfactory oil can be produced at a cost to the public which is approximately that of imported American mineral lubricating oils.

Spain, like Britain, spends millions every year on imported lubricating oil, and it is anticipated that any attempt to establish a home industry will be met by a reduction of prices on the part of the big interests controlling the foreign product. Such a threat would be met either by a tariff or by an appeal to olive growers to accept lower prices from patriotic motives, in order to set a new home industry on its feet.

## Large Helium Output

### Best Year of New U.S. Government Plant

THE Government Helium Plant, near Amarillo, Texas, designed, built and operated by the United States Bureau of Mines, Department of Commerce, produced 9,801,060 cubic feet of helium in the year ended June 30 last. This was the first fiscal year of operation after the plant was constructed. Although the plant operated only ten months of the fiscal year, having been closed in December, 1929, and February, 1930, for lack of orders for helium, the production was the largest ever turned out by the Government in one fiscal year, being about 800,000 cubic feet greater than the largest fiscal year's production of the Government's Fort Worth Helium Plant, which formerly supplied helium used by the Army and Navy. Even with this production the plant was operated at only a fraction of its present capacity, as it is capable of a production of 24,000,000 cubic feet per year.

Helium-bearing natural gas for the Amarillo plant is drawn from Government-owned gas wells on the Cliffside structure north west of Amarillo, Texas, where the Government controls gas rights in about 50,000 acres of land; it is transported to the plant through a Government-owned pipe line. In the plant the helium is extracted by cooling the natural gas under pressure to a very low temperature, at which all of its constituents, except the helium, are liquefied. After the helium has been drawn off, the other constituents are returned to the gaseous state by warming them up to atmospheric temperature. Each cubic foot of natural gas that enters the plant is cooled from atmospheric temperature to about 300° F. below zero and returned to atmospheric temperature in less than one minute. The gas from which the helium has been extracted is discharged into a pipe line, with its heating value improved by the extraction of the helium, and is sold for use as domestic and industrial fuel. All of the equipment for production and transportation of the natural gas and the extraction of the helium is operated by the Bureau of Mines.

### Cost Less Than Hydrogen

Under present conditions it costs less to operate Government airships with non-flammable helium than it would cost to operate them with flammable hydrogen. The first cost of hydrogen, as produced for airship operation, may be somewhat less than the present cost of helium. However, when diffusion of air into the gas envelope reduces the purity of the hydrogen to about 85 per cent., the envelope must be deflated because of decreased buoyancy, fire risk and danger of explosion. As no safe and economical process for purifying this hydrogen has been found, it is allowed to escape into the atmosphere and the ship must be reinflated with new hydrogen. This operation is necessary eight to ten times a year. When air diffuses into a helium-filled ship, the only serious effect is to decrease the lifting power. In this case, however, the helium can be purified at a cost of from 50 cents to $1.50 per thousand cubic feet in plants that have been designed and built by the Bureau of Mines. The new helium required over the course of a year's operation is only about 1½ times or twice the volume of the ships compared with 8 to 10 times the volume in the case of hydrogen. Thus helium, though possibly somewhat more expensive in first cost, now has considerable advantage over hydrogen in cost over a year's operation, in addition to its inestimable advantage of safety from fire and explosion.

### Aluminium Powder for Paints

THE British Engineering Standards Association has just published the last of the series of sixty-one British Standard Specifications for Paints, Varnishes and Paint Ingredients. The concluding specification is B.S.S. No. 388-1930, Aluminium Powder for Paints. This specification follows the lines of those previously issued, containing clauses regulating the composition, standard reception tests and appendices outlining standard methods for carrying out the tests. Copies of the new specification may be obtained from the Publications Department, British Engineering Standards Association, 28, Victoria Street, Westminster, S.W.1, price 2s. 2d., post free. The Association will welcome constructive comments as to the usefulness, or otherwise, of this series of specifications, which should be sent to the Director at the above address.

# Ten Years of the Dyestuffs (Import Regulation) Act

## Report of the Dyestuffs Development Committee

*The report of the Dyestuffs Industry Development Committee on the present position and development of the dyestuffs manufacturing industry in Great Britain was issued on Tuesday (H.M. Stationery Office, pp. 88, 1s. 6d.). The report, which is unanimous, is signed by Messrs. W. J. U. Woolcock (chairman), Percy Ashley, L. Blundell, C. J. T. Cronshaw, F. Hewit, L. B. Holliday, G. T. Morgan, James Morton, J. Davidson Pratt, J. Rogers, H. Sutcliffe Smith, Thomas Taylor, Jocelyn Thorpe, G. S. Whitham, and T. M. Wilcox. Mr. F. W. Hammond acted as secretary. The text of the report proper occupies 36 pages, and the remainder consists of tables of statistics of the quantities and values of dyestuff imports and exports for the eight years 1921 to 1928, and details of the various kinds of dyestuffs imported into the United Kingdom under licence for the year ended December 31, 1928.*

It may be convenient, before quoting from the general matter in the report, to give at once the committee's conclusions:—

In the opinion of the Committee the dyestuff industry to-day is in a very much more satisfactory condition than it was at the time the Dyestuffs Act was passed. The protection afforded by the Act has given British manufacturers the necessary confidence to develop their works, and has provided them with opportunities for acquiring that skill and technique which is so necessary for the production of dyestuffs of first-class quality and of consistent standards. In addition, manufacturers have been enabled to bring down their costs of production to the lowest economic levels.

The dye-making industry of Great Britain, whilst it is well established, does not, however, provide for the full need of the colour-using industries, and users are dependent upon foreign suppliers for special colours and novelties. It would be a serious blow to British users were the flow of these products to be impaired in any way.

The question now arises whether it would be possible for the industry to carry on that development and maintain its present position without the protection afforded by the Act. There are two possible opinions on this. The colour users say the Act was for ten years and no longer. The colour makers say that their increased efficiency during the last few years warrants an extension of the Act, which would enable them to complete their work. Further, the importance of the dye industry from the point of view of national security must not be overlooked, but from the point of view of obtaining this object the burden should not be laid on the colour users.

Consequently, it is to the interest of all parties concerned—that is, the Government, the users, and the dyestuff manufacturers—to continue to consider the problem in the same spirit of co-operation that has marked the period of the operation of the Dyestuffs Act, and together to agree, if possible, first whether any further assistance to the industry is necessary, and, if so, as to the form which such assistance should take.

### The Act of 1920

Reviewing the history of the Act the Committee recall the serious position of our great textile and colour-using industries at the outbreak of the war, when their supplies of dyestuffs were cut off. The colour-using industries urged the Government to lend their assistance in the establishment of a dye-manufacturing industry on the ground that otherwise they could not carry on. Later the question of national security was found to be bound up with the need for a national dye industry. Steps were taken by the Government which led first to the formation of the British Dyestuffs Corporation. In February, 1919, a Prohibition of Imports Proclamation was issued, and a committee appointed to consider applications for licences, but within the year the prohibition was declared by a Sankey judgment to be illegal. In December, 1920, the Dyestuffs (Import Regulation) Act was put on the Statute Book, the Government pledge to the colour-using industries being in the following terms:—

"It is the settled opinion of the Government that for National security it is essential that synthetic colour-making factories should be in existence, and be maintained in operation with their staffs of chemists and other experts in this country, and that the equipment should be equal in extent to that of any other possibly hostile nation. It is the settled opinion of the Government that this should be brought about without placing the textile and other colour-using industries in an unduly disadvantageous competitive position."

Under the Act, which came into force on January 15, 1921, and which expires on January 14, 1931, importation into the United Kingdom of all synthetic organic dyestuffs, colours, and colouring matters, and all organic intermediate products used in the manufacture of such dyestuffs, colours, or colouring matters, is prohibited except under licence granted by the Board of Trade on the recommendation of the Dyestuffs Advisory Licensing Committee. The constitution of this Licensing Committee consists of five representatives of the colour-using industries; three representatives of the dye-manufacturing industries; together with three independent persons, one of whom is the chairman. Of the five representatives of the dye consumers, four have been nominated by the Colour-Users' Association. Broadly, two sets of circumstances constitute grounds for the granting of licences, viz.:—(1) The lack of a British equivalent; (2) price, *i.e.*, where there is a British equivalent but the price is higher than the foreign colour, but with adequate safeguards for the British makers.

### Objects of the Act Achieved

At the outset the Committee have no hesitation in saying that the main object of the Act has been achieved, and that a substantial dye-making industry has been built up and maintained by reason of the Act in this country; and that the achievement of that object has admittedly laid a serious burden upon the colour-using industries, in the high prices which have been charged to them for dyewares during the early years of the operation of the Act, and by some interference with their access to the world's markets for their wares. It is gratifying to record, however, that the economic disadvantage has been gradually diminished, but it is obvious that any form of restriction is a hindrance to the consuming trades. The total productive capacity of dyestuffs is far greater than before the war. The increase has resulted not only from the erection of entirely new factories, but also from the extension and enlargement of the older works. Apart from the firms actually engaged in the manufacture of dyestuffs and intermediate products, there are, in addition, several other firms actively engaged in the manufacture of intermediate products or having the capacity for making them.

The remarkable progress in the aggregate production of British makers is undoubtedly an achievement, particularly if the figures for 1928 are compared with 1913. When it is borne in mind that in 1913 practically no intermediates were made in this country, and the range of colours produced was a meagre one, consisting of a limited number of direct cotton colours, sulphur colours, a few basic colours, acid wool, chrome and mordant colours, chiefly alizarine, the increase in the output is extraordinary.

### Artificial Silk Colours

Vat colours were not made in Great Britain in 1913, whereas in 1928 the production of this series alone, exclusive of indigo, was 1,877,172 lb. (16,760 cwt.), 64 per cent. of the country's requirements. Not many new colours in the sense that they have not been manufactured anywhere else in the world, have been included in the British products, with the exception of colours for the dyeing of various types of artificial silk. The latter is undoubtedly the outstanding achievement of British makers, and the foreign dyestuffs makers have followed the British in the manufacture of these products. It has to be stated, however, that there has been very little production of original character in Great Britain and on the Continent. In considering the range and production of British dyestuffs, a proper perspective can be obtained by an examination of the number and quantity of dyestuffs which it is necessary for this country to import. Very few licences were granted during 1928, on price grounds, so that it may be assumed that upwards of 99 per cent. of the importations are non-contentious

colours, i.e., dyestuffs of which equivalent products are not made in this country. In 1928 the quantities of colours imported were as follows :—

| | Lb. | Cwt. |
|---|---|---|
| Direct cotton colours (including union) | 946,909 | 8,454 |
| Acid wool colours | 563,044 | 5,027 |
| Chrome and mordant colours (including alizarine) | 810,972 | 7,241 |
| Basic colours | 119,486 | 1,067 |
| Sulphur colours | 166,872 | 1,490 |
| Vat colours | 1,069,850 | 9,552 |
| Dyestuffs for lake making | 225,756 | 2,016 |
| Oil, spirit and wax colours | 330 | 3 |
| Indigo | Nil | — |
| Dyestuffs for acetate silk | (No separate figures available.) | |
| Unclassified | 30,908 | 276 |
| | 3,934,127 | 35,126 |
| Intermediates | 825,226 | 7,368 |

An analysis of the details of the importations furnished in the reports prepared by the Dyestuffs Advisory Licensing Committee, of which a schedule will be found attached to this report—Appendix C—shows that upwards of 1,600 different brands of colour had to be imported. (These 1,600 brands represent upwards of 1,000 distinct types.) Several large users have reported that they require to import as many varieties of colours from abroad, and in some cases more, than they obtain in this country, notwithstanding the fact that the relative values of British and foreign colours correspond more or less to the generally accepted proportion of 80 per cent. and 20 per cent. respectively.

A very wide range of dyestuffs not previously made in this country has been placed on the market, and their quality is fully equal to that of any foreign manufacture, but many important dyestuffs have not yet been domestically produced, as is evidenced by the importation of 1,600 varieties during 1928, a number probably as large as that available from the domestic producers. The development in this country may be considered satisfactory from the point of view of quality, but in respect of variety it falls short of the position desired.

### Large and Small Demand

Arising out of these comments, attention should be drawn to the directions in which the British manufacture has not been developed, and it is not altogether reassuring that the tendency has been in the main to concentrate on these materials for which there is a comparatively large demand, whilst in those cases where the consumption is relatively small, the policy appears to have been to leave these to the foreign maker. It would not be pretended that this was anything but a natural tendency if looked upon from a purely commercial aspect, but in view of the entirely special conditions established in order to assist the industry, something more than this purely commercial outlook was expected. It is not desired to single out any industries which may have been less adequately provided for, as we believe these are well known to the makers, but special stress must be laid on the fact that these industries depend to a great extent upon the novelty of the effects procurable, and in order to achieve these ends specialities are indispensable. The market for these goods is not confined to this country, but is in the widest sense the world's market, and it is imperative that the producers of these goods in this country should be fully provided with the greatest possible variety of the necessary materials for their production. Anything short of this must be considered a most serious handicap. One direction in which the British dye-making industry has failed to justify the hopes of users is that development of an important group of dyestuffs has been prejudiced by British makers entering into arrangements with foreign producers, whereby the manufacture of this range has not been attempted commercially, and the user has been left entirely to draw his supplies from foreign sources. The group referred to is an important series of mordant colours.

The dyestuffs produced in the United Kingdom now represent about 93 per cent. of the quantity consumed in this country, and about 81 per cent. of the sale value of those dyestuffs. This divergence in quantity and value proportions is due to the fact that there are certain varieties of colours which are not at present produced in this country, and that these are generally of a higher average value than the ranges produced in the United Kingdom. Moreover, although the industry draws largely on home supplies in respect of intermediates, yet it is not to the full extent independent of supplies from foreign sources.

This noteworthy achievement is due in no small part to the helpful co-operation of the colour-using industries. In the early days colour users were often called upon to use dyes of British manufacture which were either not entirely satisfactory in quality or were higher in price than those which might have been obtained from abroad, in order to give the British dye-maker the necessary experience in production so essential to successful manufacture.

It is also due to the joint labours of chemist and chemical engineer. The successful preparation of these complicated organic chemicals in the research laboratories has been followed by expensive, but vitally important, trials on a semi-works scale, and then on a factory scale. Special plant has had to be devised and older apparatus to be modified to meet the increasingly stringent demands of modern colour production.

### Output of Dyestuffs and Intermediate Products

Particulars of the imports of dyestuffs into the United Kingdom during 1913, as shown in the trade accounts for that year, are given in the following table :—

| Class of dyestuff. | Country of origin. | Quantity imported. Lb. | Value. £ |
|---|---|---|---|
| Alizarine and anthracene dyestuffs. | Germany | 6,755,280 | 271,119 |
| | Other foreign countries | 55,776 | 1,126 |
| | | 6,811,056 | 272,245 |
| Aniline and naphthalene dyestuffs | Germany | 28,966,448 | 1,382,478 |
| | Switzerland | 2,479,792 | 146,278 |
| | Netherlands | 71,008 | 4,045 |
| | Belgium | 144,032 | 8,096 |
| | Other foreign countries | 37,744 | 1,648 |
| | | 31,699,024 | 1,542,545 |
| Synthetic indigo | Germany | 2,675,568 | 76,695 |
| Other coal tar dyestuffs | Germany | 16,464 | 543 |
| | Other foreign countries | 896 | 27 |
| | | 17,360 | 570 |
| | Total | 41,203,008 | 1,892,055 |

It will be observed that the total importation of dyestuffs during the year 1913 amounted to 41,203,008 lb., valued at £1,892,055, and that of this quantity approximately 38,413,760 lb. were of German origin, and the remaining 2,789,248 lb. largely of Swiss manufacture. A detailed census of the dyestuffs imported during 1913 showed that about 10,000 differently designated dyestuffs were comprised in the 41,203,008 lb. of colours which were imported. Of this number a great many were redundant and only a relatively small proportion were different chemical products. In many instances the same product was manufactured by several foreign firms under different names, and in other cases the products were mixtures of various brands.

Particulars of the imports of dyestuffs into the United Kingdom during the years 1921 to 1928 show that the imports of dyestuffs declined from 41,203,008 lb. in 1913 to 6,686,288 lb. in 1921 and 4,690,336 lb. in 1928. It is interesting to note that approximately 1,600 differently designated dyestuffs were comprised in the 4,690,336 lb. of colours which were imported in the latter year.

As already indicated, the manufacture of dyestuffs in this country prior to the war was only carried on to a very limited extent, the production being approximately 9,114,112 lb., and even this total included at least a proportion of mixtures made from imported foreign dyestuffs.

The following table shows by categories the quantities of

dyestuffs produced in the United Kingdom during the years 1913, 1922 to 1928 :—

| Category. | 1913. Lb. | 1922. Lb. | 1923. Lb. | 1924. Lb. |
|---|---|---|---|---|
| Direct cotton colours .. | 1,680,671 | 2,726,290 | 4,411,878 | 5,059,084 |
| Acid wool colours .. | 631,195 | 4,188,786 | 4,813,620 | 5,192,474 |
| Chrome and mordant colours (including alizarine) | 4,315,933 | 4,927,822 | 7,744,110 | 6,940,263 |
| Basic colours .. | 311,661 | 917,946 | 1,367,754 | 1,561,400 |
| Sulphur colours | 1,928,493 | 5,865,769 | 7,739,182 | 7,832,909 |
| Vat colours (including indigo) .. | —* | 1,369,513 | 5,398,634 | 5,003,713 |
| Dyestuffs for lake making.. | 6,927 | 478,925 | 807,811 | 754,466 |
| Oil, spirit and wax and miscellaneous colours .. | 239,254 | 3,357,916 | 817,730 | 898,395 |
| Aggregate Total | 9,114,134 | 23,832,967 | 33,100,719 | 33,242,704 |

| Category. | 1925. Lb. | 1926. Lb. | 1927. Lb. | 1928. Lb. |
|---|---|---|---|---|
| Direct cotton colours .. | 4,940,838 | 4,180,508 | 5,615,607 | 7,117,283 |
| Acid wool colours .. | 4,498,653 | 5,217,259 | 6,233,179 | 7,848,509 |
| Chrome and mordant colours (including alizarine) .. | 6,256,276 | 6,972,112 | 7,502,229 | 8,431,430 |
| Basic colours .. | 1,710,556 | 1,308,813 | 2,014,806 | 2,688,450 |
| Sulphur colours | 6,225,791 | 4,636,930 | 7,117,233 | 7,266,263 |
| Vat colours (including indigo) .. | 7,295,769 | 6,237,703 | 8,818,923 | 11,042,908 |
| Dyestuffs for lake making.. | 1,014,334 | 947,933 | 1,138,375 | 1,388,925 |
| Dyestuffs for acetate silk .. | — | — | — | 227,501 |
| Oil, spirit and wax and miscellaneous colours .. | 715,185 | 795,742 | 1,111,404 | 4,949,203 |
| Aggregate Total | 32,693,402 | 30,297,000 | 39,551,756 | 50,960,472 |

It will be seen from these figures that the output of dyestuffs has increased year by year. The total has advanced from 23,832,967 lb. in 1922 to no less than 50,960,472 lb. in 1928. This represents an increase of 114 per cent. for the six years, a rate of progress which can be regarded as very satisfactory. Equally satisfactory is the fact that there were increases in the output of every class of dyestuff. Comparing the year 1928 with 1922 the increases in the various classes are as follows :—

| Colour. | Increase. Quantity. lb. | Percentage. |
|---|---|---|
| Direct cotton colours | 4,390,993 | 161 |
| Acid wool colours | 3,659,723 | 87 |
| Chrome and mordant colours (including alizarine) | 3,503,608 | 71 |
| Basic colours | 1,770,504 | 193 |
| Sulphur colours | 1,400,494 | 24 |
| Vat colours | 1,595,893 | 567 |
| Dyestuffs for lake making | 910,000 | 190 |
| Oil, spirit and wax colours | 377,094 | 105 |
| Indigo | 8,077,502 | 742 |
| Unclassified | 1,441,694 | 48 |

The large advance in the production of vat colours is especially notable and satisfactory, since it indicates the growing extent to which the demand for colours with a high standard of fastness is being met. The special fastness qualities and the great variety of shades now obtainable by the use of this class of dyestuff have no doubt been largely responsible for their greatly extended use.

The following statement shows the comparison between domestic production and the imports of dyestuffs during the year 1928 :—

| Classification. | British Production. | Foreign Importation. | Total. | British Percentage of Total, as shown in Total Column. |
|---|---|---|---|---|
| | lb. | lb. | lb. | |
| Direct cotton colours (including union) ..... | 7,117,283 | 946,909 | 8,064,192 | 88 |
| Acid wool colours | 7,848,509 | 563,044 | 8,411,553 | 93 |
| Chrome and mordant colours (including alizarine) | 8,431,430 | 810,972 | 9,242,402 | 91 |
| Basic colours..... | 2,688,450 | 119,486 | 2,807,936 | 96 |
| Sulphur colours .. | 7,266,263 | 166,872 | 7,433,135 | 98 |
| Vat colours ..... | 1,877,172 | 1,069,850 | 2,947,022 | 64 |
| Dyestuffs for lake making..... | 1,388,925 | 225,756 | 1,614,681 | 86 |
| Oil, spirit and wax colours ..... | 735,010 | 330 | 735,340 | 100 |
| Indigo ..... | 9,165,736 | Nil | 9,165,736 | 100 |
| Dyestuffs for acetate silk ..... | 227,501 | (No separate figures available) | 227,501 | 99 |
| Unclassified ..... | *4,214,193 | 30,908 | 4,245,101 | |
| Total ..... | 50,960,472 | †3,934,127 | 54,894,599 | 93 |

Taking the year 1928, increases in the percentage of dyestuffs supplied by British manufacturers, are especially noticeable in the acid wool series, the chrome and mordant series, the basic series and in the vat series. The percentage in the latter class increased from 51 per cent. in 1922 to 64 per cent. in 1928. As regards synthetic indigo, the capacity of the works at Ellesmere Port is now not only sufficient to meet the whole of the requirements in this country, but also to produce considerable quantities of this product for export, largely to China.

It should be noted that whereas before the war such dyestuffs as were manufactured in this country were largely produced from foreign intermediates, the quantity of intermediates which it was necessary to import in 1928 was relatively unimportant, the dyestuff manufacturers either making their own intermediates or being able to obtain their supplies from other manufacturers in this country.

It has to be admitted that the development of foreign trade in dyestuffs has not taken place to the extent that might have been expected, and it is suggested that the ultimate success of the industry demands the extension on a much larger scale of this outlet for production. It is only in this way that the ability of British makers to meet world competition can be established.

Since the year 1922 there has been a definite and steady improvement in the range of dyestuffs manufactured in this country together with a marked advance in quality, and an appreciable improvement in the regularity of deliveries.

### Incidental Developments

The value and importance of a dyestuff industry as a nucleus around which a nation can logically develop other branches of organic chemistry has often been stressed, and the Committee feel it would be useful to examine to what extent this has obtained in this country.

The use in Great Britain of organic chemical reagents in

* Only manufactured from imported advanced intermediates.

* This figure includes a small quantity of intermediates which it is not possible to distinguish separately.

† This figure does not agree with the import figures given in Table I, Appendix A, by reason of the fact that approximately 6,521 cwt. imported intermediate products are included in the 40,999 cwt. " other sorts."

the vulcanisation of rubber started some seven or eight years ago, and has now developed to such an extent that it has become the accepted practice. Products used for this purpose are complex in character and varied in number, and it is, the Committee feels, satisfactory that this country is practically independent both as to range and quantity of foreign sources of supply. Other products of importance, and of a similar character, which have been developed and their use extended have been substances used as anti-agers and softening agents in the rubber industry. The Committee feel, too, that the fine chemical industry has also been assisted by reason of the development of National dyestuffs industry.

There is some evidence, however, of lack of research of an original character, and this is exemplified in a minor degree by the absence of production of ancillary products for colour-using industries. This is a marked development in the industry, and is facilitating the production of novelties, in addition to assisting dyers and finishers in the use of modern dyestuffs. Many of these products of proved value are now offered in this country by foreign makers, and whilst some counter products are now being made by British makers, the Committee view with alarm the fact that original work in this development of dyeing technique is more vigorously and successfully attempted by foreign makers.

### Quality of British Dyes

In the early days of the British dyestuff industry there was a good deal of complaint that the quality of some of the products produced in this country was not equal to the foreign standards to which the dye users were accustomed. The chief complaints were either that the British dyestuffs were unsatisfactory as regards shade, fastness, physical conditions, etc., or that there was a lack of uniformity in the qualities of deliveries. There is no doubt that there was some foundation for these complaints. The great demand for munitions during the war and the urgent requirements for dyestuffs immediately afterwards prevented dyestuff manufacturers from devoting the necessary study to problems of standardisation. Moreover, they had not then the experience required to turn out with regularity products of first-class quality. The problem is largely one of purity of intermediates, and during the last few years the question has been given the attention it demanded, and the general opinion throughout the colour-using industries is that the output of British makers now compares very favourably with that of the foreign dyestuff producers, and that little ground for complaint as regards quality now exists. In certain instances the quality of the British product is in advance of foreign competitive material. In view of the fact that the general position so far as quality is concerned is so satisfactory, the Committee do not think it necessary to deal with individual products on this point.

It cannot be ignored, however, that the British makers are greatly indebted to the patience and accommodation of the British users in assisting them throughout the initial stages of the manufacture of their new products, as in a highly technical and skilled industry like the production of dyestuffs, it is quite obvious that British makers were frequently not in a position to give exact equivalents. On the other hand, the high standard required by British users to enable them to maintain their supremacy in the world's markets, has made it imperative for the British makers to meet world competition in their qualities, and generally they have been successful in that effort.

### Novelties

During recent years five outstanding developments in dyestuffs chemistry have taken place, namely, naphthol ice colours, caledon jade green, duranol and celatene colours, indigosol products and soledon colours, and of these three are British discoveries covered by British patents.

*Naphthol Ice Colours.*—This series of important dyestuffs by virtue of patents covering in most cases both manufacture and use, has been a monopoly of one continental firm. A limited range has been manufactured recently by one British firm, but now that the earliest patents have lapsed, and there is doubt as to the validity of later ones, other British firms are preparing to manufacture, and have already expended large sums, and the Committee feel that the future will see the manufacture of this important group developed in this country. The value and importance of this group is shown by the fact that of the intermediates imported in this country nearly 80 per cent. in value is represented by this series. To the adequate development of this group by British makers, the Committee attach the highest importance, and they regret that it is in this sphere, both as regards manufacture and invention, that the British makers have made relatively little progress.

*Caledon Jade Green.*—Although vat colours have been available since 1901, and their numbers have now reached several hundreds, important gaps in the range are still in process of being filled. The most important addition in the last ten years is that of caledon jade green, discovered by Scottish Dyes, Ltd.

### Cellulose Acetate Silk Dyes

*Dyestuffs for Cellulose Acetate Silk.*—Of the products put on the British market since January, 1921, and not previously manufactured anywhere, the most important from the scientific and technical point of view are the dyestuffs specifically designed for use on artificial silk, in particular the cellulose acetate silk dyes, and the solubilised vat colours derived from anthraquinone vat colours. It is not too much to say that the contribution of the British dyestuffs industry towards the solution of the problem of colouring cellulose acetate silk has constituted a very big factor in the commercial success of that fibre. Cellulose acetate silk colours are a comparatively recent development, due almost entirely to the British dyestuffs industry. This form of artificial silk consists of highly acetylated cellulose, which possesses no affinity for the classes of dyestuffs ordinarily used for colouring cellulose fibres.

Here and there were found individual members of different classes—especially the basic class—for which cellulose acetate silk exhibits some affinity, but the range was extremely limited and unsatisfactory. In the initial stages of the commercial development of the manufacture of this new variety of artificial silk, the lack of appropriate dyes was a very grave drawback, for it was realised that until some suitable means of dyeing the fibre was discovered there could be no hope of its becoming a commercial success. Much research work, largely of a more or less empirical nature, was carried out with a view to overcoming this obstacle. Such expedients as swelling the fibre in a variety of liquids to increase its physical attraction for dyestuffs, partially saponifying the water of which it is composed, to regenerate sufficient cellulose to attract the dyes normally used for cotton, etc., were resorted to, but they led to no reliable method of application on an industrial scale.

### New Ranges of Products

In 1922 the British Dyestuffs Corporation discovered and elaborated a range of entirely new products—the "Ionamine" dyes—which possess temporarily the character of soluble products having no affinity for cotton, and which are converted during the dyeing process into soluble dyes having affinity only for cellulose acetate. The same firm discovered the affinity for cellulose acetate of a range of basic anthraquinone derivatives, which they placed on the market under the name of "Duranol" colours. These, like the closely allied "Celatene" colours of Scottish Dyes, Ltd., are characterised by excellent properties of fastness. The "Dispersol" colours of the British Dyestuffs Corporation are mainly insoluble azo dyes in a finely dispersed form, similar to the so-called "S.R.A." products brought out and developed by the makers of cellulose acetate silk ("Celanese") themselves.

*Soledon Colours.*—The utility of the soluble esters of the vat colours of the anthraquinone series (soledon colours), if less apparent at the moment for a number of reasons, is certain to extend and develop as knowledge and understanding of these products increase, and economic considerations place them within close reach of consumers to whom their price at the moment is prohibitive, or who are not yet equipped for the reception of the new idea which these colours represent.

*Caledon Blue RC.*—This is the reward for the scientific study of a complicated phase of the vat colour field. The vat blues were the first vat colours to be discovered, and in many cases were manufactured by methods more or less empirical in character, with the result that many are complicated mixtures. Scottish Dyes, Ltd., have succeeded not only in isolating

the fast element, but also in manufacturing it, and rightly claim that in Caledon Blue RC. they have the fastest of the fast blues.

In addition to the foregoing discoveries and developments of outstanding importance, the dyestuffs industry of Great Britain has been responsible for a number of developments outside the province of actual dyestuff manufacture. Notable examples are to be seen in accelerators and antioxidants for use in rubber manufacture, and new processes for the application and discharging of colours.

A process for dyeing mixed fabrics containing cellulose acetate with vat colours is designed for the dyeing of those fabrics which, along with cotton or viscose, contain cellulose, acetate, and in which it is required that the cotton or viscose is to be dyed with vat colours, the cellulose acetate to be left white in order that it may be subsequently dyed a colour or left white, as desired.

*(To be concluded.)*

## Colour Users' Memorandum

FOLLOWING the publication of the report of the Dyestuffs Industry Development Committee, the Colour Users Association has issued the Memorandum which it presented to the Committee, setting out its arguments against any extension of the Dyestuffs (Import Regulation) Act, 1920, beyond January 14th next, the date originally fixed for its expiration. The Memorandum deals with the range and production and the prices and quality of British dyestuffs, and classifies the penalties which the Act has inflicted on the colour users under the general terms of (1) interference with their ability to obtain supplies of dyestuffs of proved quality, and (2) limitation of access to developments and improvements in world markets. The conclusions of the Association on the dyestuffs position are summarised under six main heads, and considerable portions of the Memorandum had been embodied in the report of the Development Committee.

### Free Lime in Set Portland Cement

A CALORIMETRIC method of estimating the amount of free lime present in set Portland cement is described in a paper published by the Department of Scientific and Industrial Research (Building Research, Technical Paper No. 9; H.M. Stationery Office, 6d.). The method proceeds by means of two simple determinations of heat of hydration of samples ignited at two different temperatures. The sample is dried, crushed, and well mixed. A portion of it is then ignited in a crucible at 350° C. for half an hour, cooled in a desiccator, and transferred to a test-tube in the calorimeter, a second calorimeter being used without a sample to allow a correction to be made for external changes. When the liquid in both calorimeters reaches a steady temperature the test-tube is broken and the contents of the calorimeter well mixed for four minutes. The rise in temperature is noted, corrections made for the heat losses from the calorimeter, and the heat evolved calculated. The procedure is repeated with a second sample of the same weight, and the heat evolved again calculated. The free lime present in terms of calcium oxide is then easily found. The method gives satisfactory results with hydrated Portland cements, with Portland cement concretes with ordinary inert aggregates, and with sand-lime mortars.

### Dyestuffs Licences for August

THE following statement relating to applications for licences under the Dyestuffs (Import Regulation) Act, 1920, made during August has been furnished to the Board of Trade by the Dyestuffs Advisory Licensing Committee:

Applications received during the month totalled 488, of which 424 were from merchants or importers. To these should be added 13 cases outstanding on July 31, 1930, making a total for the month of 501. These were dealt with as follows: Granted, 450 (of which 432 were dealt with within 7 days of receipt); referred to British makers of similar products, 23 (of which 22 were dealt with within 7 days of receipt); outstanding on August 30, 28. Of the total of 501 applications received, 454, or 91 per cent., were dealt with within 7 days of receipt.

## Chemical Trade of Tunisia

### Export of Natural Phosphate

TUNISIA is the second producing and first exporting country in the world of natural phosphate. In 1912 a plant was erected at El Afrane, near Tunis, for the manufacture of superphosphate by the Société Algérienne de Produits Chimiques et d'Engrais, which has three plants in Algeria. The Tunis plant was partly destroyed by fire in 1917, resumed operations in 1921, and had practically doubled its capacity by 1925. The 1927 production figure reached 42,672 metric tons. Its capacity in 1929 was reported as 44,000 tons. The output of this plant is practically marketed locally. Imports of superphosphates, amounting to 14,138 tons, were largely from Algeria.

The Tunisian plant purchases annually about 10,000 tons of iron pyrites of Spanish origin; 150 of Chilean nitrates; 100 of ammonium sulphate; 900 of Alsatian potash; and some nitric acid.

The only really important local fertiliser firm, Agricultor (Engrais de Sidi Bel Hassen), makes a specialty of various compound fertilisers. Its annual requirements of pure potash, aggregating 1,000 tons, are imported. Recent imports of chemical fertilisers have shown a marked increase, as follows: 1920—109 tons, 76,000 francs; 1926—1,437 tons, 833,000 francs; 1927—2,037 tons, 1,554,000 francs; 1928—3,254 tons, 2,758,000 francs.

### Explosives Manufacture

Just outside of the city of Tunis, at La Manouba, a plant belonging to the Société Générale d'Explosifs, of Paris, produces annually 250 tons of cheddite, which is used in the Tunisian iron, lead, and zinc mines. It is reported to import yearly about 40 tons of dinitrotoluene and trinitrotoluene, worth about 600,000 francs. The importation of gunpowder is a Government monopoly.

The Tunisian vineyards cover an approximate area of 30,000 hectares (about 75,000 acres), planted mainly in wine grapes. Although the hot and dry climate provides an excellent check to mildew and fungous diseases generally, fully 1,500 tons of sulphur are needed annually for preventive treatment of vines. Of this quantity about 65 per cent. is sublimate and 35 per cent. triturate.

Imports of sulphur pyrites totalled 6,449 metric tons in 1927, and 4,778 in 1928, and of crude sulphur and sulphur ores, 3,904 metric tons in 1927 and 4,522 in 1928. The iron pyrites were reported as purchased almost exclusively for the fertiliser industry. Copper sulphate is also used in the treatment of grape vines. In 1927, 255 metric tons were imported, and in 1928, 194 tons—from France, Italy, Belgium, and Great Britain.

During the last three years Tunisia has imported an average of 900 tons of carbonate of soda, refined; about 330 tons in the form of crystals; and about 20 tons of tartaric acid and 36 tons of tannin—all of these items principally from France. Approximately 1,000 kilos of anhydrous ammonia are imported annually from France for the ice-making plants.

### Alloy and Tool Steels

JOHN BROWN AND CO., LTD., Atlas Works, Sheffield, have issued a new edition of their "Alloy and Tool Steels" booklet, giving instructions for the treatment of their various steels. The steels suited for particular tools, shafts, engine parts or gears are listed with details of their composition and recommended methods and temperatures for forging, hardening and tempering. There is an interesting table in the alloy steels section showing the materials recommended for automobile parts, for racing machines and also for those in which price is an important factor. A well-produced booklet of 100 pages is concluded with conversion tables and tables for Brinell numbers and weights of bars.

### Chilean Nitrate Plant

THE new Pedro de Valdivia nitrate plant of the Lautaro Nitrate Co. to operate the Guggenheim process of treating crude nitrate is being constructed at a very satisfactory rate. About 2,300 workmen are employed, and adequate housing facilities exist for them. A railway about 30 kilometers in length now connects the site of this plant with the Anglo-Chilean Consolidated Nitrate Corporation's Maria Elena plant.

# From Week to Week

RECENT WILLS include Mr. Benjamin Vezey, of Hill View, Box, Wilts, soap manufacturer, £2,709.

THE BLEACH WORKS of the Handforth Bleaching Co., Ltd., controlled by the Bleachers' Association and employing about 200 workpeople, are to be closed down, it is announced, owing to bad trade.

THE SOVIET GOVERNMENT has decided to establish a Museum and Institute of Chemical History, having for its object the study of chemical science and industry, the spread of chemical knowledge and the furtherance of chemical progress in Russia.

A FIRE and series of explosions occurred last week at the metallurgical works of the British Thermit Co., Ltd., Speke Road, Liverpool. The outbreak is believed to have been caused by heavy rain soaking through the roof of a building on to some chemicals, and it was several hours before the firemen subdued the flames with the use of sand.

ILLICIT TRAFFIC in dangerous drugs was assuming terrifying proportions and the Customs were powerless to fight the traffickers, stated Mr. L. A. Lyall, the British member, to the League of Nations Permanent Central Opium Board on Monday. He expressed the opinion that the traffic could only be stopped in the producing countries, and that the way to do it was by limiting manufacture.

DAMAGE estimated at £800 was caused by fire on Monday night at the premises of the Wells Compound Co., bitumen products and lacquer manufacturers, 327, Scotland Street, Glasgow. Many tins, drums and barrels of bitumen which had been stored in the building blazed fiercely for some time before the fire brigade managed to get the flames under control. It is thought that the tar in a tar boiler boiled over and ignited the remainder of the material.

THROUGH THE BURSTING of a metal cylinder containing acetylene gas, three Glasgow boys received severe burns on Monday night, and are in a serious condition. The accident occurred at the Lochburn Ironworks, Lochburn Road, Maryhill, Glasgow, which are shortly being demolished. The boys had gained access to a yard in which the container of acetylene gas was lying, and managed in some way to release the contents. It appears that one of them applied a lighted match, the gas exploded, and the children were enveloped in flames.

THE NEW CONFERENCE HALL added to the Science Museum, South Kensington, is now almost completed, and will be used for scientific lectures during the coming winter. It will hold an audience of 200, and is well equipped for physical and chemical demonstrations. Where a group attending a public lecture appears likely to exceed 60 in number, the new hall will be put into use, but its chief object will be for more technical lectures, and it is hoped that scientific societies, as well as special visiting groups from schools, technical institutes and industrial firms will avail themselves of it.

THE GERMAN MATCH MONOPOLY CO., established under the credit agreement between Germany and Ivar Kreuger, has issued an opening balance-sheet dated June 1 last. This shows a loss of £239,000, of which £211,000 is accounted for by the purchase and closing down of rivals and fighting competition, especially that of Russia. The first business year of the company—limited to seven months—will be unfavourably influenced by the fact that recently sales have come to a standstill, since the trade had laid in stocks before the monopoly came into force. An improvement is expected towards the end of the year.

THE TWIN STATES NATURAL GAS CO. has announced the acquisition of over 91 per cent. of the controlling interest of the Midland Natural Gas Co., together with additional natural gas properties located in Roane, Ritchie, Fayette, Mingo, Gilmer, Kanawha and Boone counties in West Virginia, and Martin, Floyd and Magoffin counties in Kentucky, U.S.A. Through these acquisitions Twin States Natural Gas Co. materially increases its holdings, and now owns and operates directly or through subsidiaries natural gas properties totalling more than 57,000 acres in Pennsylvania, West Virginia and Kentucky, containing more than 450 producing wells, with a daily rate in excess of 27,000,000 cubic feet and estimated gas reserves of more than 340 milliard cubic feet.

MR. G. N. NORMAN, technical director of the Hercules Powder Co., Wilmington, U.S.A., is at present in England, as part of a general tour of European countries.

DONATIONS to the Castleford Explosion Relief Fund, organised by the Urban Council, now total over £8,150. In addition, the Lord Mayor of Leeds' Fund for the same cause has exceeded £3,500.

THE TAR MACADAM WORKS, of the Hillhead Quarries, Ltd., near Buxton, were destroyed by fire on Wednesday night. The outbreak occurred in the tar-mixing plant, about 2,000 gallons being involved, and quickly spread to other departments. The loss is estimated at £100,000.

A PHIAL containing 25 morphine sulphate and atrophine sulphate tablets was lost last week in Radford Road, Nottingham, and a warning note was issued by the Nottingham police. It was found by a child, whose mother, apprehensive of the dangers of morphine, poured the contents down a drain.

TIMOTHY WHITE'S (1928), LTD., are extending their chain of shops throughout the south of England, and in consequence have had to make considerable increases in their warehouse and office accommodation at their headquarters in Portsmouth. A large new warehouse has just been completed, and a contract has been placed for another for the chemists' department.

THE COMMERCIAL SECRETARY to H.M. Embassy, Moscow, has forwarded to the Department of Overseas Trade a copy of the standard draft agreement on which contracts for technical aid between foreign firms and Soviet organisations are based. This agreement may be inspected on application to the Department (Room 71), 35, Old Queen Street, London S.W.1, quoting Reference No. 23,863/30.

A REPLY to the recent Bankers' Manifesto, which called for reciprocal trade agreements with Empire countries with duties "on all imports from all other countries," was issued on Monday and points out the dangers of a tariff policy. A large number of influential signatories include Charles Bell (of Chas. Zimmermann and Co. (Chemicals), Ltd., London) and the Old Strand Chemical and Drug Co., Ltd., London.

THE DIRECTORS of Radium and Rare Earths Treatment Co., N.L., whose property is at Olary, South Australia, report that they have engaged a highly qualified chemist in Germany to come to Australia to develop a process that will treat the company's ilmenite ore for the production of pure white titanium pigment. They state that this chemist has already treated the company's ore successfully, and that efforts in this direction by Melbourne and Adelaide chemists have not given satisfactory results.

THE WORKS of the British Silk Dyeing Co. at Balloch, which have been built and equipped at a cost of £200,000, are to be opened on September 20 by Sir John Gilmour, M.P. The works cover an area of nine acres, and will provide employment for 350 workers. The site at Balloch, near Loch Lomond, was chosen because the people of that district are accustomed to the dyeing industry, and also because the Loch Lomond water is peculiarly suited to the special process work. Weighting, dyeing and finishing of silk will be carried out at the works, and it is estimated that 500 pieces of silk will be the daily output.

A JOINT MEETING of the Refractory Materials Section and the Building Materials Section of the Ceramic Society will be held in London on Monday, Tuesday, and Wednesday, September 22, 23 and 24. On the Monday afternoon there will be a meeting at the Building Trades Exhibition at Olympia, and the official banquet will follow in the evening at the Trocadero Restaurant. On Tuesday a visit will be paid to the works of the Morgan Crucible Co., Ltd., at Battersea, or there is an alternative excursion to the works of the Sussex Brick Co., Ltd., Horsham. On Wednesday the sections hold their respective council and general business meetings. A number of technical papers will be read.

### Obituary

MR. WILLIAM FREDERICK PAYNE, engineer to the Selby Olympia Oil and Cake Co., on Monday, aged 57.

MR. EDWIN CLARK, for over 40 years chemical foreman at the Muspratt Works of the United Alkali Co., aged 73.

# Patent Literature

*The following information is prepared from published Patent Specifications and from the Illustrated Official Journal (Patents) by permission of the Controller to H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at 1s. each.*

## Abstracts of Accepted Specifications

331,451. MANURES. Soc. Chimique de la Grande Paroisse Azote et Produits Chimiques, 40, Rue du Colisée, Paris. International Convention date, November 20, 1928.

A fertilizer is produced together with sodium bicarbonate by subjecting sodium nitrate and potassium chloride, or products, natural or artificial, containing these salts, to double decomposition according to the equation

$$NaNO_3 + KCl = KNO_3 + NaCl \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (a),$$

treating the resulting mixture with carbon dioxide, ammonia, and water to set up the reaction

$$NaCl + CO_2 + NH_3 + H_2O = NaHCO_3 + NH_4Cl \quad \ldots\ldots\ldots\ldots (b),$$

and, if any unchanged sodium nitrate is present, to set up also the reaction

$$NaNO_3 + CO_2 + NH_3 + H_2O = NaHCO_3 + NH_4\ NO_3 \quad \ldots\ldots\ldots (c)$$

and finally utilising the differences of solubility to separate the sodium bicarbonate from the compound fertilizer. The latter consists mainly of potassium nitrate and ammonium chloride, but ammonium nitrate and potassium chloride may also be present according as the sodium nitrate or the potassium chloride was originally in excess. The composition of the fertilizer may also be varied by transforming only a portion of the salts by the reactions (*a*) and (*c*).

331,472. ALKALINE-EARTH MOLYBDATES. I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. International Convention date, December 8, 1928.

In the treatment of fully roasted molybdenite with solutions or suspensions of magnesium, calcium, or other alkaline-earth hydroxides to produce the corresponding molybdates the reaction is effected, preferably at the boiling point, in a solution of which the alkaline reaction is barely perceptible, such condition being attained by a gradual addition of the hydroxide. Excess of hydroxide is to be avoided as leading to the formation of soluble molybdates.

331,482.—DIOLEFINES. S. V. Lebedev, 10B, Nejigorodskaja, Leningrad, Russia. Application date, January 30, 1929.

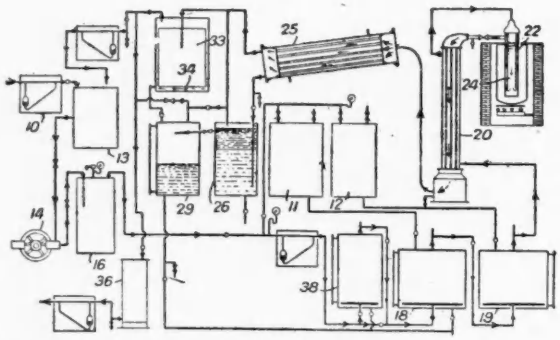
Alcohols having fewer carbon atoms in the molecule than the diolefine required are heated in presence of a dehydrating catalyst and a dehydrogenating catalyst. The use of methyl, ethyl, and propyl alcohols as starting materials is specified. Preferably, the heating is effected under reduced pressure and the products are cooled rapidly. In an example butadiene is obtained by passing 95 per cent. ethyl alcohol over aluminium and zinc oxides at 400° C. and ¼ atm. pressure, and thence into bromine, fractionally distilling the bromides, and reducing the residual tetrabromide, *e.g.*, by zinc oxide in alcoholic solution.

331,494. ORGANIC MERCURY COMPOUNDS. Sir G. C. Marks, London. From E. I. Du Pont de Nemours and Co., Wilmington, Delaware, U.S.A. Application date, January 21, 1929.

Organic mercury compounds, which when added to inert fillers are suitable for use as seed disinfectants, are obtained by reaction between a mercury salt and an alkyl, aryl, or aralkyl derivative of a tetravalent metal lying above mercury in the electrochemical series. Specified derivatives of this type are tetraethyl lead, triethyl lead chloride, tetraethyl tin, tetramethyl lead, tetraphenyl lead, tetraphenyl tin, tetracyclohexyl lead, and tetrabenzyl tin. Tetraalkyl lead may be produced *in situ* by interaction of an alkyl sulphate and a sodium-lead alloy.

331,525. BENZALDEHYDE AND BENZOIC ACID. Gas Light and Coke Co., Horseferry Road, and W. G. Adam, W. V. Shannan, and M. Cuckney, Tar and Ammonia Products Works, Beckton, East Ham, London. Application date, January 29, 1929.

In the catalytic oxidation of toluene vapour with air to produce benzaldehyde and/or benzoic acid, the reaction mixture contains a substantial excess of toluene; water vapour and the effluent gases of the reaction may also be present. Air entering the system at 10 is mixed with the effluent gases in a vessel 13, compressed at 14, and passed from a storage vessel 16 to a toluene vaporiser 18 and a water vaporiser 19. The reaction mixture thence passes through a preheater 20 to the central tube 24 of the catalytic apparatus,




331,525

this tube being filled with metal turnings to promote the preheating. The mixture passes thence through the annular outer tube 22 packed with the catalyst and immersed in a bath of fused sodium nitrite. The reaction products pass by way of the preheater 20, and if desired through a toluene scrubber operated at 70—80° C., to a condenser 25, the condensate being collected in a separator 26. The upper layer of toluene containing dissolved benzaldehyde and benzoic acid flows into a reservoir 29, from which it is passed periodically to a second toluene vaporiser 38; the benzoic acid may first be extracted with alkali. Concentration in the vaporiser 38 proceeds at 70—80° C. The aqueous layer in the separator 26 contains some maleic acid and is periodically removed. The operation of the system is described in detail.

331,535. CATALYTIC AGENTS. Gas Light and Coke Co., Horseferry Road, and W. G. Adam, W. V. Shannan, and M. Cuckney. Tar and Ammonia Products Works, Beckton, East Ham, London. Application date, January 29, 1929.

Catalysts for use in the oxidation of toluene are formed into coherent masses with the aid of a small proportion of asbestos fibres serving as a binder. Thus a mixture of iron vanadate and iron oxide may be mixed into a paste with not more than 30 per cent. of the fibres and extruded in the form of rods which are cut up into short lengths. The catalyst may be precipitated upon the asbestos.

331,537. DYE INTERMEDIATES. R. J. Loveluck, E. G. Beckett, J. Thomas, and Scottish Dyes, Ltd., Earls Road, Grangemouth. Application date, December 28, 1928.

To obtain *o*-amino-β-halogen derivatives of anthraquinone, the products obtained by oxidizing the *o*-amino-β-sulphonic acids with potassium persulphate in sulphuric acid are treated with a halogenating agent, *e.g.*, sodium chlorate and hydrochloric acid, to replace the sulpho group by halogen, and the halogenated derivatives are reduced with sodium hydrosulphide, hydrogen sulphide and ammonia, or neutral hydrosulphite. In examples (1) 1-amino-2-sulpho-anthraquinone is oxidized to 1-nitroso-2-sulpho-anthraquinone, which is halogenated to obtain 1-nitroso-2-chlor-anthraquinone, yielding 1-amino-2-chlor-anthraquinone on reduction; (2) 2-amino-3-sulpho-anthraquinone is oxidized to 2-nitro-3-sulpho-anthraquinone, which is halogenated to obtain 2-nitro-3-chlor-anthraquinone yielding 2-amino-3-chlor-anthraquinone on reduction.

331,552. Treating Sulphate Minerals. Sir D. Mawson, Adelaide University, Adelaide, Australia. Application date, April 4, 1929.

Sulphate minerals, such as alunite, jarosite, copiatite, and carphosiderite, are decomposed by treatment with ammonia, liquid, gaseous, or in solution. The insoluble residue contains aluminium or ferric hydroxide. The aluminium hydroxide may be converted into an alumina-silica gel for use as an adsorbent by dissolving in caustic soda and adding sodium silicate. The ammoniacal solution contains ammonium and potassium sulphates. The free ammonia is neutralised with sulphuric or nitric acid, whereupon the solution may be evaporated, with or without addition of soluble phosphate, to obtain a fertiliser. Alternatively, the potassium and ammonium sulphates may be separated by fractional crystallisation, or the ammonia may be recovered for use again by treatment with lime.

331,596. Sulphochlorides. A. Carpmael, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, April 10, 1929.

Aromatic aminosulphochlorides are obtained by the action of chlorosulphonic acid on aromatic primary aminosulphonic acids or nuclear substituted derivatives thereof. In examples are described the production of 4-chloraniline-3-sulphochloride, 2 : 5-dichloraniline-4-sulphochloride, 4-aminotoluene-3-sulphochloride, 2-chloro-4-aminotoluene-5-sulphochloride, 3-chloro-2-aminotoluene-5 (or 6)-sulphochloride, 1:3-dimethyl-4-aminobenzene-5-sulphochloride, 1 : 3-diaminobenzene-4 : 6-disulphochloride, 1-amino-3-hydroxybenzene-4 : 6-disulphochloride, a 1-naphthylamine-disulphochloride, aniline-2-sulphochloride, 6-chloraniline-3-sulphochloride, 2 (or 3)-nitraniline-4-sulphochloride, 1-chloro-2-naphthylamine-6-sulphochloride, 2 : 8-aminonaphthol-3 : 6-disulphochloride, benzidine-$2:2^1$ (or $3:3^1$) -disulphochloride, and a 1-amino-dichloronaphthalene-4-sulphochloride. The products are intermediates for dyestuffs, for pharmaceutical and insecticidal preparations, and for the manufacture of auxiliary materials for use in dyeing and printing.

331,597. Dye Intermediates. A. Carpmael, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, April 10, 1929.

β-Naphthylaminophenoxy fatty acids are obtained by the interaction in presence of a sulphite of β-naphthol, β-naphthylamine, or a substitution product of either, with a 3- or 4-aminophenoxy fatty acid or a derivative thereof. Thus 2 : 3-oxynaphthoic acid reacts with sodium-4-aminophenoxy acetate and sulphite to produce $3^1$-carboxy-$2^1$-naphthyl-4-aminophenoxy acetic acid, which couples in acetic acid solution with diazotised 4-nitraniline-2-sulphonic acid, yielding a blue dye. Numerous other examples are given, and several of the products yield coloured nitroso compounds. The 3- and 4-aminophenoxy fatty acids used as starting materials are obtainable by interaction of the sodium salts of the corresponding nitrophenols with monochlor fatty acids, followed by reduction of the nitro group.

331,620. Dyes. A. Carpmael, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, April 30, 1929.

Vat dyeing thioxanthones are obtained by reaction of β-mercaptan compounds of the anthracene series with anthraquinone-2-carboxylic acids substituted in the 1-position by halogen or a nitro or diazo group, and treatment of the resulting anthrylthioanthraquinone-2-carboxylic acids with acid condensing agents. In examples, 2-mercaptoanthracene and 2 : 6-dimercaptoanthracene are caused to react with 1-chloroanthraquinone-2-carboxylic acid, and the product in each case is treated with phosphorus pentachloride to obtain a yellowish brown dye for cotton. The mercaptoanthracenes are obtained by reduction of the corresponding mercaptoanthraquinones, and the dimercaptoanthracenes by reduction of the corresponding anthraquinone disulphochlorides.

331,648. Magnesium Sulphate. E. Rodolfo, 4, Via Lanzone, Milan, Italy. Application date, May 21, 1929.

Relates to the treatment of waste water from artificial silk factories containing, for example, sulphates of magnesium, sodium, and zinc, and sulphuric acid. Free sulphuric acid may first be neutralised by addition of dolomite or calcined dolomite. Milk of lime is then added to precipitate calcium sulphate, magnesium hydroxide, and zinc hydroxide which are separated from the solution. The latter is evaporated to obtain crystallised sodium sulphate. The precipitate is dispersed in water and carbon dioxide is bubbled through at 50-60° C., thus producing a solution of magnesium sulphate up to a concentration of 20° Bé. This solution is separated and the magnesium sulphate crystallised. The carbon dioxide used may be from furnace gases or from the calcined dolomite or lime.

331,654. Recovering Acetylene. G. F. Horsley and F. Roffey, Norton Hall, The Green, Norton-on-Tees, and Imperial Chemical Industries, Ltd., Millbank, London. Application date, May 24, 1929.

Acetylene is removed from gaseous mixtures containing it by solution in an ester or ether boiling above 100° C., preferably an ester, ether, or ester-ether of a polyhydric alcohol. Specified solvents are glycol monoformate, glycol mono- and di-alkyl ethers, esters of monoalkyl ethers of ethylene glycol, glycerol mono- and di-acetates, glycerol mono-, di-, and tri-alkyl ethers, esters of mono- or di-alkyl ethers of glycerol, ethereal phthalates, and ethyl lactate.

331,674. Sulphates. O. Kaselitz and Kali Forschungs-Anstalt Ges., 5, Schonebergerstrasse, Berlin. Application date, June 17, 1929.

Production of sulphates containing little or no water of crystallisation is effected by heating concentrated solutions thereof in closed vessels to temperatures at which the solubility becomes practically nil, *e.g.*, to about 200° C., separating the salt and liquors without appreciably reducing the pressure, and reducing the heat energy contained in the liquors. Applications of the invention to Glauber's salt and to the sulphates of magnesium, cadmium, iron, cobalt, nickel, and manganese are referred to. Soluble impurities are removed in the mother liquor, which may be discarded after recovery of its heat energy, *e.g.*, as steam.

331,687. Dye Intermediates. Imperial Chemical Industries, Ltd., Millbank, London, and M. Wyler, Crumpsall Vale Chemical Works, Blackley, Manchester. Application date, June 27, 1929.

Aminoxylenol (6-oxy-2-amino-1 : 3-dimethylbenzene) and its N-acyl derivatives are obtained by nitrating the corresponding 1 : 3-dimethyl-2-acylamino benzene, reducing the nitro group, diazotising the resulting amino group, converting into the hydroxy compound, and removing the acyl group by hydrolysis.

331,697. Dyes. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, July 10, 1929. Addition to 320,397. (See The Chemical Age, Vol. XXI, p. 552.)

Halogen derivatives of N-dihydro-1:2:$2^1$:$1^1$-anthraquinoneazines are purified by treatment in sulphuric acid with manganese dioxide or other higher oxides of manganese. The production of the halogen derivatives and their purification by this method may be performed in one operation.

Note.—Abstracts of the following Specifications, which are now accepted, appeared in The Chemical Age when they became open to inspection under the International Convention :—310,815 (I.G. Farbenindustrie Akt.-Ges.), relating to 2-chloro-benzo-thiazoles, see Vol. XXI, p. 10 ; 311,239 (J. E. Barnitzke), relating to flotation process for oxide ores, see Vol. XXI, p. 23 [Metallurgical Section] ; 311,283 (I.G. Farbenindustrie Akt.-Ges.), relating to dianthraquinonyl amines of the anthraquinone-acridone series, see Vol. XXI p. 58 ; 311,385 (Soc. of Chemical Industry in Basle), relating to dyestuffs containing metals, see Vol. XXI, p. 34 ; 311,707 (Dr. A. Wacker Ges. für Electrochemische Industrie Ges.), relating to carrying out ester condensations, see Vol. XXI, p. 58 ; 312,907 (Rheinische Kampfer Fabrik Ges.), relating to thymol, see Vol. XXI, p. 114 ; 314,542 (I.G. Farbenindustrie Akt. Ges.), relating to tri-substituted thioureas, see Vol. XXI, p. 203 ; 314,899 (I.G. Farbenindustrie Akt.-Ges.), relating to condensation products of the anthraquinone-acridone series, see Vol. XXI, p. 224 ; 318,550 (I.G. Farbenindustrie Akt.-Ges.), relating to oxidation of benzene hydrocarbons, see Vol. XXI, p. 479.

## Specifications Accepted with Date of Application

308,603. Saponifying glycerides of fatty acids, Process for. Deutsche Gold-und Silber-Scheideanstalt vorm. Roessler. March 23, 1928.

308,792. Separation of gaseous mixtures by diffusion. I.G. Farbenindustrie Akt.-Ges. March 31, 1928.

311,657. Resinous substances, and compositions containing the same. British Celanese, Ltd. May 12, 1928.

311,697. Alkylating cellulose, Process of. E. I. Du Pont de Nemours and Co. May 14, 1928.

311,708. Monoazo dyestuffs, Manufacture of. I.G. Farbenindustrie Akt.-Ges. May 14, 1928.

312,173. Glacial acetic acid from dilute acetic acids, Manufacture of. I.G. Farbenindustrie Akt.-Ges. May 18, 1928.

313,045. Recovery of copper from dilute ammoniacal solutions thereof. I.G. Farbenindustrie Akt.-Ges. June 5, 1928.

313,159. Cracking liquid hydrocarbons, Process and apparatus for. Trent Process Corporation. June 8, 1928.

313,597. Reduction of iron ores. Trent Process Corporation. June 16, 1928.

315,262. Sodium nitrate, Manufacture of. Anglo-Chilean Consolidated Nitrate Corporation. July 10, 1928.

318,556. Therapeutic agents, Manufacture of. I.G. Farbenindustrie Akt.-Ges. September 5, 1928.

318,865. Inhibiting or reducing the perishing of artificial and natural varieties of rubber. I.G. Farbenindustrie Akt.-Ges. September 10, 1928.

319,682. Stable polymerisation products from vinyl esters, Manufacture of. I.G. Farbenindustrie Akt.-Ges. September 26, 1928.

319,690. Extracting magnesia from dolomite, Process for. Rheinische Westfalische Kalkwerke. September 26, 1928.

333,507. Dyestuffs and dyestuff intermediates, Production of. D. A. W. Fairweather, J. Thomas, and Scottish Dyes, Ltd. February 8, 1929.

333,511. Hydrocarbons which are saturated with hydrogen, Manufacture of. J. Y. Johnson (*I.G. Farbenindustrie Akt.-Ges.*). April 2, 1929.

333,513. Azo dyestuffs. Imperial Chemical Industries, Ltd., and R. Brightman. April 11, 1929. Addition to 330,607.

333,518. Superphosphate, Treatment of. L. Adelantado. May 9, 1929.

333,550. Valuable liquid fuels, Manufacture of. J. Y. Johnson (*I.G. Farbenindustrie Akt.-Ges.*). March 11, 1929.

333,553. Converting high boiling mineral oils containing unsaturated compounds into lower boiling hydrocarbons with simultaneous decoloration. Naamlooze Vennootschap Mijnbouw.-En Cultuurmaatschappij Boeton. January 16, 1929.

333,559. Reserving agents for wool, Manufacture of. A. Carpmael (*I.G. Farbenindustrie Akt.-Ges.*). May 9, 1929.

333,561. Condensation products from aldehydes and phenols, Manufacture of. A Carpmael (*I.G. Farbenindustrie Akt.-Ges.*). May 11, 1929.

333,568. Derivatives of benzanthrone, Manufacture of. J. Y. Johnson (*I.G. Farbenindustrie Akt.-Ges.*). February 15, 1929.

333,573. Substantive *o*-carboxyazo dyestuffs containing copper, Manufacture of. A. Carpmael (*I.G. Farbenindustrie Akt. Ges.*). May 10, 1929.

333,598. Crystal growth, Apparatus and method for. Imperial Chemical Industries, Ltd., and H. E. Cocksedge. April 18, 1929.

333,666–7. Derivatives of naphthalene, Manufacture of. J. Y. Johnson (*I.G. Farbenindustrie Akt.-Ges.*). June 4, 1929.

333,670. Stannic oxide gels, Preparation of. J. J. Etridge and Imperial Chemical Industries, Ltd. June 5, 1929.

333,687. Refining of heavy mineral oils by means of liquid sulphurous acid. W. W. Triggs (*Allgemeine Ges. für Chemische Industrie*). June 21, 1929.

333,741. Anhydrous magnesium chloride practically free from oxide, Preparation of. I.G. Farbenindustrie Akt.-Ges. October 4, 1928.

333,762. Green vat dyestuffs of the benzanthrone series, Manufacture of. J. Y. Johnson (*I.G. Farbenindustrie Akt.-Ges.*). September 4, 1929.

333,774. Alloys. W. P. Digby. May 30. 1929.

333,783. Arylaminophenolcarboxylic acids, Manufacture of. September 28, 1929. W. W. Groves (*I.G. Farbenindustrie Akt.-Ges.*). September 28, 1929.

333,797. Decomposition of crude phosphate, Processes for. Chemieverfahren-Ges. November 28, 1928.

333,805. Raw phosphates, Decomposition of. A. Messerschmidt. October 23, 1928. Addition to 300,961.

333,816. Producing a titanium or ferro-titanium regulus. W. and H. Mathesius. November 1, 1928.

333,834. Alkali carbonates, Manufacture of. International Industrial and Chemical Co., Ltd. November 21, 1928.

333,835. Producing aluminium sulphate. M. Buchner. November 24, 1928.

## Applications for Patents

*[In the case of applications for patents under the International Convention, the priority date (that is, the original application date abroad which the applicant desires shall be accorded to the patent) is given in brackets, with the name of the country of origin. Specifications of such applications are open to inspection at the Patent Office on the anniversary of the date given in brackets, whether or not they have been accepted.]*

Anderson, I. B., Imperial Chemical Industries, Ltd., and Thomson, R. F. Production of anthracene derivatives. 25,369. August 25.

Becher, W. Preparation of chlorine dioxide. 25,401. August 26. (Holland, August 26, 1929.)

Bosch Akt.-Ges., R. Production of plastic masses from condensation products of phenol and aldehyde. 25,652. August 28. (Germany, September 5, 1929.)

Carpmael, A., and I.G. Farbenindustrie Akt.-Ges. Manufacture of oxidation products of derivatives of higher fatty acids containing sulphur. 25,371. August 25.

—— Manufacture of products for use in textile industry. 25,580. August 27.

—— Impregnating, cementing, etc., absorbent masses. 25,581. August 27.

—— Manufacture of phenyl indol-sulphonic acids. 25,723. August 28.

—— Manufacture of esters of the leuco compounds of vat dyestuffs. 25,724. August 28.

—— Manufacture of stable, acid water-soluble sulphuric acid esters of leuco compounds of vat dyestuffs. 25,902. August 29.

—— Manufacture of rubber, etc. 25,976. August 30.

—— Dry separation of carbon dioxide and ammonia from gases. 25,977. August 30.

Cordingley, H., Imperial Chemical Industries, Ltd., and Ingold, C. K. Manufacture of halogenonitrobenzenes. 25,440. August 26.

Dehn, F. B., and Deutsche Hydrierwerke Akt.-Ges. Manufacture of products resembling turkey-red oils. 25,494. August 26.

Groves, W. W., and I.G. Farbenindustrie Akt.-Ges. Manufacture of agents for emulsifying, cleansing, and wetting. 25,469. August 26.

—— Manufacture of derivatives of 2.3-hydroxynaphthoic acid. 25,894. August 29.

—— Manufacture of hydroxy-anthracene-carboxylic acids. 25,866. August 29.

Groves, W. W. and Monsanto Chemical Works. Refining crude phthalic anhydride. 25,592. August 27.

Harper, H., and Imperial Chemical Industries, Ltd. Destructive hydrogenation of carbonaceous materials. 25,441. August 26.

Holt, F., and Richards, C. W. Manufacture of polychlornaphthalenes. 25,836. August 29.

I.G. Farbenindustrie Akt.-Ges., and Johnson, J. Y. Manufacture of valuable derivatives of polymerized organic cyanogen compounds. 25,712. August 28.

—— Purification of gases. 25,713. August 28.

—— Removal of dust from oils and tars. 25,714. August 28.

—— Apparatus for measurement of thermal conductivity of gases, etc. 25,715. August 28.

—— Operation of parallel electric arcs. 25,716. August 28.

—— Manufacture of organic compounds containing oxygen. 25,717. August 28.

—— Manufacture of intermediate products and dyestuffs. 25,718. August 28.

—— Manufacture of fertilisers. 25,814. August 29.

—— Recovery of saturated hydrocarbons from hydrocarbon mixtures. 25,815. August 29.

—— Manufacture of aminosulphonic acids. 25,816. August 29.

—— Manufacture of wetting, etc., agents. 25,817. August 29.

—— Manufacture of organic pigment preparations, etc. 25,818. August 29.

I.G. Farbenindustrie Akt.-Ges. Manufacture of derivatives of 2.3-hydroxynaphthoic acid. 25,864. August 29.

—— Manufacture of hydroxy-anthracene-carboxylic acids. 25,866. August 29.

—— Manufacture of stable, acid, water-soluble sulphuric acid esters of leuco compounds of vat dyestuffs. 25,902. August 29.

—— Manufacture of polymerization products of unsaturated ketones. 25,582. August 27. (Germany, March 16, 1928.)

—— Manufacture of cellulose derivatives. 25,737. August 28. (Germany, August 28, 1929.)

—— Manufacture of optically-active phenyl-propanol-methylamines. 25,867. August 29. (Germany, August 31, 1929.)

Imperial Chemical Industries, Ltd. Process for improving age-resisting properties of rubber, etc. 25,577. August 27.

—— Preparation of vinyl esters. 25,578. August 27. (United States, August 28, 1929.)

Imperial Chemical Industries, Ltd., and Thomas, R. Manufacture of polychlornaphthalenes. 25,836. August 29.

Imperial Chemical Industries, Ltd. Manufacture of azo dyes. 25,870. August 29. (United States, August 30, 1929.)

—— Manufacture of rubber, etc. 25,871. August 29. (United States, August 30, 1929.)

# Weekly Prices of British Chemical Products

*The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.*

## General Heavy Chemicals

ACID ACETIC, 40% TECH.—£19 per ton.

ACID, CHROMIC.—1s. 0½d. per lb. d/d U.K.

ACID HYDROCHLORIC.—Spot, 3s. 9d. to 6s. per carboy d/d, according to purity, strength and locality.

ACID NITRIC, 80° Tw.—Spot £20 to £25 per ton, makers' works according to district and quality.

ACID SULPHURIC.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations; 140° Tw., Crude Acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.

AMMONIA (ANHYDROUS).—Spot, 11d. per lb., d/d in cylinders.

AMMONIUM BICHROMATE.—8d. per lb. d/d U.K.

BISULPHITE OF LIME.—£7 10s. per ton, f.o.r. London, packages free.

BLEACHING POWDER, 35/37%.—Spot, £7 10s. per ton d/d station in casks, special terms for contracts.

BORAX, COMMERCIAL.—Crystals, £13 10s. per ton; granulated, £12 10s. per ton; powder, £14 per ton. (Packed in 1 cwt. bags carriage paid any station in Great Britain. Prices quoted are for one ton lots and upwards).

CALCIUM CHLORIDE (SOLID), 70/75%.—Spot, £4 15s. to £5 5s. per ton d/d in drums.

CHROMIUM OXIDE.—9½d. and 10d. per lb. according to quantity d/d U.K.

CHROMETAN.—Crystals, 3½d. per lb. Liquor, £18 10s. per ton d/d U.K.

COPPER SULPHATE.—£25 to £25 10s. per ton.

METHYLATED SPIRIT 61 O.P.—Industrial, 1s. 7d. to 1s. 11d. per gall. pyridinised industrial, 1s. 9d. to 2s. 1d. per gall.; mineralised 2s. 8d. to 2s. 11d. per gall. 64 O.P., 1d. extra in all cases. Prices according to quantity.

NICKEL SULPHATE.—£38 per ton d/d.

NICKEL AMMONIA SULPHATE.—£38 per ton d/d.

POTASH CAUSTIC.—£30 to £33 per ton.

POTASSIUM BICHROMATE CRYSTALS AND GRANULAR.—4½d. per lb. nett d/d U.K., discount according to quantity; ground ½d. per lb. extra.

POTASSIUM CHLORATE.—3¾d. per lb., ex-wharf, London, in cwt. kegs.

POTASSIUM CHROMATE.—8d. per lb. d/d U.K.

SALAMMONIAC.—Firsts lump, spot, £42 10s. per ton d/d station in barrels. Chloride of ammonia, £37 to £45 per ton, carr. paid.

SALT CAKE, UNGROUND.—Spot, £3 7s. 6d. per ton d/d station in bulk.

SODA ASH, 58° E.—Spot, £6 per ton, f.o.r. in bags, special terms for contracts.

SODA CAUSTIC, SOLID, 76/77°E.—Spot, £14 10s. per ton, d/d station.

SODA CRYSTALS.—Spot, £5 to £5 5s. per ton, d/d station or ex depot in 2 cwt. bags.

SODIUM ACETATE 97/98%.—£21 per ton.

SODIUM BICARBONATE, REFINED.—Spot, £10 10s. per ton d/d station in bags.

SODIUM BICHROMATE CRYSTALS.—3½d. per lb. nett d/d U.K., discount according to quantity. Anhydrous ¾d. per lb. extra.

SODIUM BISULPHITE POWDER, 60/62%.—£17 10s. per ton delivered for home market, 1-cwt. drums included; £15 10s. f.o.b. London.

SODIUM CHLORATE.—2¾d. per lb.

SODIUM CHROMATE.—3½d. per lb. d/d U.K.

SODIUM NITRITE.—Spot, £19 per ton, d/d station in drums.

SODIUM PHOSPHATE.—£14 per ton, f.o.b. London, casks free.

SODIUM SILICATE, 140° Tw.—Spot, £8 5s. per ton, d/d station returnable drums.

SODIUM SULPHATE (GLAUBER SALTS).—Spot, £4 2s. 6d. per ton, d/d address in bags.

SODIUM SULPHIDE SOLID, 60/62%.—Spot, £10 5s. per ton d/d station in drums. Crystals—Spot, £7 10s. per ton d/d station in casks.

SODIUM SULPHITE, PEA CRYSTALS.—Spot, £13 10s. per ton, d/d station in kegs. Commercial—Spot, £9 per ton, d/d station in bags.

## Coal Tar Products

ACID CARBOLIC CRYSTALS.—6d. to 7½d. per lb. Crude 60's 1s. 11d. to 2s. per gall. August/December.

ACID CRESYLIC 99/100.—2s. 2d. to 2s. 4d. per gall. B.P., 5s. per gall. 97/99.—2s. 1d. to 2s. 2d. per gall. Refined, 2s. 7d. to 2s. 10d. per gall. Pale, 95%, 1s. 9d. to 1s. 10d. per gall. 98%, 1s. 11d. to 2s. Dark, 1s. 6d. to 1s. 7d.

ANTHRACENE.—A quality, 2d. to 2½d. per unit. 40%, £4 10s. per ton.

ANTHRACENE OIL, STRAINED, 1080/1090.—4½d. to 5½d. per gall. 1100, 5½d. to 6d. per gall.; 1110, 6d. to 6½d. per gall. Unstrained (Prices only nominal).

BENZOLE.—Prices at works: Crude, 10d. to 11d. per gall.; Standard Motor, 1s. 5d. to 1s. 6d. per gall.; 90%, 1s. 7d. to 1s. 8d. per gall.; Pure, 1s. 10d. to 1s. 11d. per gall.

TOLUOLE.—90%, 1s. 9d. to 1s. 11d. per gall. Pure, 1s. 11d. to 2s. 2d. per gall.

XYLOL.—1s. 5d. to 1s. 10d. per gall. Pure, 1s. 8d. to 2s. 1d. per gall.

CREOSOTE.—Cresylic, 20/24%, 6¾d. to 7d. per gall.; Heavy, for Export, 6¼d. to 6¾d. per gall. Home, 4d. per gall. d/d. Middle oil, 4¼d. to 5d. per gall. Standard specification, 3d. to 4d. per gall. Light gravity, 1½d. to 1¾d. per gall. ex works. Salty, 7½d. per gall.

NAPHTHA.—Crude, 8¼d. to 8¾d. per gall. Solvent, 90/160, 1s. 3d. to 1s. 3½d. per gall. Solvent, 95/160, 1s. 4d. to 1s. 6d. per gall. Solvent 90/190, 11d.. to 1s. 2½d. per gall.

NAPHTHALENE, CRUDE.—Drained Creosote Salts, £3 to £4 per ton. Whizzed, £4 to £5 per ton. Hot pressed, £8 per ton.

NAPHTHALENE.—Crystals, £10 per ton. Purified Crystals, £14 10s. per ton. Flaked, £11 per ton.

PITCH.—Medium soft, 46s. to 47s. 6d. per ton, f.o.b., according to district. Nominal.

PYRIDINE.—90/140, 3s. 6d. to 4s. per gall. 90/160, 3s. 6d. to 3s. 9d. per gall. 90/180, 1s. 9d. to 2s. 3d. per gall. Heavy prices only nominal.

## Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated:

ACID AMIDONAPHTHOL DISULPHO (1-8-2-4).—10s. 9d. per lb.

ACID ANTHRANILIC.—6s. per lb. 100%.

ACID GAMMA.—Spot, 3s. 9d. per lb. 100% d/d buyer's works.

ACID H.—Spot, 2s. 3d. per lb. 100% d/d buyer's works.

ACID NAPHTHIONIC.—1s. 5d. per lb. 100% d/d buyer's works.

ACID NEVILLE AND WINTHER.—Spot, 2s. 7d. per lb. 100% d/d buyer's works.

ACID SULPHANILIC.—Spot, 8¼d. per lb. 100% d/d buyer's works.

ANILINE OIL.—Spot, 8¼d. per lb., drums extra, d/d buyer's works.

ANILINE SALTS.—Spot, 8¼d. per lb. d/d buyer's works.

BENZALDEHYDE.—Spot, 1s. 8d. per lb., packages extra, d/d buyer's works.

BENZIDINE BASE.—Spot, 2s. 6d. per lb. 100% d/d buyer's works.

BENZOIC ACID.—Spot, 1s. 8½d. per lb. d/d buyer's works.

*o*-CRESOL 30/31° C.—£3 1s. 10d. per cwt., in 1 ton lots.

*m*-CRESOL 98/100%.—2s. 9d. per lb., in ton lots.

*p*-CRESOL 34·5° C.—1s. 9½d. per lb., in ton lots.

DICHLORANILINE.—1s. 10d. per lb. f.o.r. works.

DIMETHYLANILINE.—Spot, 1s. 8d. per lb., drums extra d/d buyer's works.

DINITROBENZENE.—8d. per lb.

DINITROCHLORBENZENE.—£74 per ton d/d.

DINITROTOLUENE.—48/50° C., 7½d. per lb.; 66/68° C., 9d. per lb. f.o.r. works.

DIPHENYLAMINE.—Spot, 1s. 8d. per lb. d/d buyer's works.

*a*-NAPHTHOL.—Spot, 1s. 11d. per lb. d/d buyer's works.

*B*-NAPHTHOL.—Spot, £65 per ton in 1 ton lots, d/d buyer's works.

*a*-NAPHTHYLAMINE.—Spot, 1s. per lb. d/d buyer's works.

*B*-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb. d/d buyer's works.

*o*-NITRANILINE.—5s. 11d. per lb.

*m*-NITRANILINE.—Spot, 2s. 6d. per lb. d/d buyer's works.

*p*-NITRANILINE.—Spot, 1s. 8d. per lb. d/d buyer's works.

NITROBENZENE.—Spot, 6½d. per lb, 5-cwt. lots, drums extra, d/d buyer's works.

NITRONAPHTHALENE.—9d. per lb.

R. SALT.—Spot, 2s. per lb. 100% d/d buyer's works.

SODIUM NAPHTHIONATE.—Spot, 1s. 6½d. per lb. 100% d/d buyer's works.

*o*-TOLUIDINE.—Spot, 8d. per lb., drums extra, d/d buyer's works.

*p*-TOLUIDINE.—Spot, 1s. 9d. per lb. d/d buyer's works.

*m*-XYLIDINE ACETATE.—3s. 1d. per lb. ex works.

## Wood Distillation Products

ACETATE OF LIME.—Brown, £9 15s. to £10 5s. per ton. Grey, £16 10s. to £17 10s. per ton. Liquor, 9d. per gall.

ACETONE.—£78 per ton.

CHARCOAL.—£6 to £8 10s. per ton, according to grade and locality.

IRON LIQUOR.—1s. 3d. per gall. 32° Tw. 1s. per gall. 24° Tw.

WOOD CREOSOTE.—1s. 9d. per gall., unrefined.

WOOD NAPHTHA, MISCIBLE.—3s. 8d. to 3s. 11d per gall. Solvent, 4s. to 4s. 3d. per gall.

WOOD TAR.—£3 10s. to £4 10s. per ton

BROWN SUGAR OF LEAD.—£38 per ton.

## Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 6d. to 1s. 2d. per lb., according to quality; Crimson, 1s. 3d. to 1s. 5d. per lb., according to quality.

ARSENIC SULPHIDE, YELLOW.—1s. 8d. to 1s. 10d. per lb.

BARYTES.—£5 10s. to £7 per ton, according to quality.

CADMIUM SULPHIDE.—4s. 10½d. to 5s. 3d. per lb.

CARBON BISULPHIDE.—£26 to £28 per ton, according to quantity; drums extra.

CARBON BLACK.—3½d. to 4 1/16d. per lb., ex wharf.

CARBON TETRACHLORIDE.—£40 to £50 per ton, according to quantity, drums extra.

CHROMIUM OXIDE, GREEN.—1s. 2d. per lb.
DIPHENYLGUANIDINE.—2s. 9d. per lb.
LITHOPONE, 30%.—£20 to £22 per ton.
SULPHUR.—£9 10s. to £13 per ton, according to quality.
SULPHUR CHLORIDE.—4d. to 7d. per lb., carboys extra.
SULPHUR PRECIP. B.P.—£55 to £60 per ton, according to quantity.
ZINC SULPHIDE.—8d. to 11d. per lb.

## Pharmaceutical and Photographic Chemicals

ACID, ACETIC, PURE, 80%.—£37 per ton, ex wharf London, barrels free.
ACID, ACETYL SALICYLIC.—2s. 9d. to 2s. 11d. per lb., according to quantity.
ACID, BENZOIC B.P.—2s. to 2s. 3d. per lb., for synthetic product, according to quantity. Solely ex Gum, 1s. 3d. to 1s. 6d. per oz.; 50-oz. lots, 1s. 3d. per oz.
ACID, BORIC B.P.—Crystal, £31 per ton; powder, £32 per ton; For one ton lots and upwards. Packed in 1-cwt. bags carriage paid any station in Great Britain.
ACID, CAMPHORIC.—19s. to 21s. per lb.
ACID, CITRIC.—1s. 6d. to 1s. 6¾d. per lb., less 5%.
ACID, GALLIC.—2s. 11d. per lb. for pure crystal, in cwt. lots.
ACID, MOLYBDIC.—5s. 3d. per lb. in ¼ cwt. lots. Packages extra. Special prices for quantities and contracts.
ACID, PYROGALLIC, CRYSTALS.—7s. 3d. per lb. Resublimed, 8s. 3d.
ACID, SALICYLIC, B.P. PULV.—1s. 5d. to 1s. 8d. per lb. Technical.—1s. to 1s. 2d. per lb.
ACID, TANNIC B.P.—2s. 8d. to 2s. 10d. per lb.
ACID, TARTARIC.—1s. 0¼d. per lb., less 5%.
ACETANILIDE.—1s. 5d. to 1s. 8d. per lb. for quantities.
AMIDOL.—7s. 6d. to 9s. per lb., d/d.
AMIDOPYRIN.—7s. 9d. to 8s. per lb.
AMMONIUM BENZOATE.—3s. 3d. to 3s. 9d. per lb., according to quantity. 18s. per lb. ex Gum.
AMMONIUM CARBONATE B.P.—£36 per ton. Powder, £39 per ton in 5 cwt. casks. Resublimated, 1s. per lb.
AMMONIUM MOLYBDATE.—4s. 9d. per lb. in ¼ cwt. lots. Packages extra. Special prices for quantities and contracts.
ATROPHINE SULPHATE.—9s. per oz.
BARBITONE.—5s. 9d. to 6s. per lb.
BENZONAPHTHOL.—3s. to 3s. 3d. per lb.
BISMUTH CARBONATE.—6s. 6d. per lb.
BISMUTH CITRATE.—6s. 9d. per lb.
BISMUTH SALICYLATE.—6s. 7d. per lb.
BISMUTH SUBNITRATE.—5s. 6d. per lb.
BISMUTH NITRATE.—Cryst. 4s. 4d. per lb.
BISMUTH OXIDE.—8s. 6d. per lb.
BISMUTH SUBCHLORIDE.—8s. per lb.
BISMUTH SUBGALLATE.—6s. 9d. per lb. Extra and reduced prices for smaller and larger quantities of all bismuth salts respectively.
BISMUTHI ET AMMON LIQUOR.—Cit. B.P. in W. Qts. 1s. 0½d. per lb.; 12 W. Qts. 11½d. per lb.; 36 W. Qts. 11d. per lb.
BORAX B.P.—Crystal, £21 10s. per ton; powder, £22 per ton; For one ton lots and upwards. Packed in 1 cwt. bags carriage paid any station in Great Britain.
BROMIDES.—Ammonium, 1s. 9d. per lb.; potassium, 1s. 5½d. per lb.; granular, 1s. 5d. per lb.; sodium, 1s. 8d. per lb. Prices for 1 cwt. lots.
CALCIUM LACTATE.—B.P., 1s. 1½d. to 1s. 3d. per lb., in 1 cwt. lots.
CAMPHOR.—Refined flowers, 3s. to 3s. 2d. per lb., according to quantity; also special contract prices.
CHLORAL HYDRATE.—3s. 1d. to 3s. 4d. per lb.
CHLOROFORM.—2s. 4½d. to 2s. 7½d. per lb., according to quantity.
CREOSOTE CARBONATE.—6s. per lb.
ETHERS.—S.G. ·730—1s. to 1s. 1d. per lb., according to quantity; other gravities at proportionate prices.
FORMALDEHYDE, 40%.—37s. per cwt., in barrels, ex wharf.
GUAIACOL CARBONATE.—4s. 6d. to 4s. 9d. per lb.
HEXAMINE.—2s. 3d. to 2s. 6d. per lb.
HOMATROPINE HYDROBROMIDE.—30s. per oz.
HYDRASTINE HYDROCHLORIDE.—English make offered at 120s. per oz.
HYDROGEN PEROXIDE (12 VOLS.).—1s. 4d. per gallon, f.o.r. makers' works, naked. B.P., 10 vols., 2s. to 2s. 3d. per gall.; 20 vols., 3s. per gall.
HYDROQUINONE.—3s. 9d. to 4s. per lb., in cwt. lots.
HYPOPHOSPHITES.—Calcium, 2s. 5d. per lb.; potassium, 2s. 8½d. per lb.; sodium, 2s. 7½d. per lb., in 1 cwt. lots, assorted.
IRON AMMONIUM CITRATE.—B.P., 2s. 5d. per lb. for 28 lb. lots. Green, 3s. 1d. per lb., list price. U.S.P., 3s. 3d. per lb. list price.
IRON PERCHLORIDE.—18s. to 20s. per cwt., according to quantity.
IRON QUININE CITRATE.—B.P., 8½d. to 8¾d. per oz., according to quantity.
MAGNESIUM CARBONATE.—Light commercial, £31 per ton net.
MAGNESIUM OXIDE.—Light commercial, £62 10s. per ton, less 2½%; Heavy commercial, £21 per ton, less 2½%; in quantity lower; Heavy Pure, 2s. to 2s. 3d. per lb.
MENTHOL.—A.B.R. recrystallised B.P., 15s. 6d. per lb. net; Synthetic, 9s. 6d. to 11s. per lb.; Synthetic detached crystals, 9s. 6d. to 11s. per lb., according to quantity; Liquid (95%), 9s. per lb.
MERCURIALS B.P.—Up to 1 cwt. lots, Red Oxide, crystals, 8s. 4d. to 8s. 5d. per lb., levig., 7s. 10d. to 7s. 11d per lb.; Corrosive Sublimate, Lump, 6s. 7d. to 6s. 8d. per lb., Powder, 6s. to 6s. 1d. per lb.; White Precipitate, Lump, 6s. 9d. to 6s. 10d. per lb., Powder, 6s. 10d. to 6s. 11d. per lb., Extra Fine, 6s. 11d. to 7s. per lb.; Calomel, 7s. 2d. to 7s. 3d. per lb.; Yellow Oxide, 7s. 8d. to 7s. 9d. per lb.; Persulph, B.P.C., 6s. 11d. to 7s. per lb.; Sulph. nig., 6s. 8d. to 6s. 9d. per lb. Special prices for larger quantities.
METHYL SALICYLATE.—1s. 3d. to 1s. 5d. per lb.
METHYL SULPHONAL.—18s. 6d. to 20s. per lb.
METOL.—9s. to 11s. 6d. per lb. British make.
PARAFORMALDEHYDE.—1s 9d. per lb. for 100% powder.
PARALDEHYDE.—1s. 4d. per lb.
PHENACETIN.—3s. 9d. to 4s. 1d. per lb.
PHENAZONE.—5s. 6d. per lb.
PHENOLPHTHALEIN.—5s. 11d. to 6s. 1½d. per lb.
POTASSIUM BITARTRATE 99/100% (Cream of Tartar).—90s. per cwt., less 2½ per cent.
POTASSIUM CITRATE.—B.P.C., 2s. 3d. per lb. in 28 lb. lots. Smaller quantities 1d. per lb. more.
POTASSIUM FERRICYANIDE.—1s. 7½d. per lb., in 125 lb. kegs.
POTASSIUM IODIDE.—16s. 8d. to 17s. 2d. per lb., according to quantity.
POTASSIUM METABISULPHITE.—6d. per lb., 1 cwt. kegs included f.o.r. London.
POTASSIUM PERMANGANATE.—B.P. crystals, 5½d per lb., spot.
QUININE SULPHATE.—1s. 8d. to 1s. 9d. per oz., bulk in 100 oz. tins
RESORCIN.—2s. 10d. to 3s. per lb., spot.
SACCHARIN.—43s. 6d. per lb.
SODIUM BENZOATE B.P.—1s. 9d. per lb. for 1-cwt. lots.
SODIUM CITRATE, B.P.C., 1911, AND U.S.P. VIII.—1s. 11d. per lb., B.P.C. 1923, and U.S.P. IX—2s. 3d. per lb. Prices for 28 lb. lots. Smaller quantities 1d. per lb. more.
SODIUM FERROCYANIDE.—4d. per lb., carriage paid.
SODIUM HYPOSULPHITE, PHOTOGRAPHIC.—£15 per ton, d/d consignee's station in 1-cwt. kegs.
SODIUM NITROPRUSSIDE.—16s. per lb.
SODIUM POTASSIUM TARTRATE (ROCHELLE SALT).—95s. to 100s. per cwt. net. Crystals, 2s. 6d. per cwt. extra.
SODIUM SALICYLATE.—Powder, 1s. 10d. to 2s. 2d. per lb. Crystal, 1s. 11d. to 2s. 3d. per lb.
SODIUM SULPHIDE, PURE RECRYSTALLISED.—10d. to 1s. 2d. per lb.
SODIUM SULPHITE, ANHYDROUS.—£27 10s. to £29 10s. per ton, according to quantity. Delivered U.K.
SULPHONAL.—9s. 6d. to 10s. per lb.
TARTAR EMETIC, B.P.—Crystal or powder, 1s. 9d. to 2s. per lb.
THYMOL.—Puriss, 8s. 3½d. to 9s. 2d. per lb., according to quantity. Natural, 12s. per lb.

## Perfumery Chemicals

ACETOPHENONE.—7s. per lb.
AUBEPINE (EX ANETHOL).—12s. per lb.
AMYL ACETATE.—2s. 6d. per lb.
AMYL BUTYRATE.—5s. per lb.
AMYL CINNAMIC ALDEHYDE.—10s. per lb.
AMYL SALICYLATE.—2s. 6d. per lb.
ANETHOL (M.P. 21/22° C.).—7s. per lb.
BENZALDEHYDE FREE FROM CHLORINE.—2s. 6d. per lb.
BENZYL ACETATE FROM CHLORINE-FREE BENZYL ALCOHOL.—1s. 10d. per lb.
BENZYL ALCOHOL FREE FROM CHLORINE.—1s. 10d. per lb.
BENZYL BENZOATE.—2s. 6d. per lb.
CINNAMIC ALDEHYDE NATURAL.—13s. 3d. per lb.
COUMARIN.—11s. per lb.
CITRONELLOL.—8s. per lb.
CITRAL.—8s. per lb.
ETHYL CINNAMATE.—6s. 6d. per lb.
ETHYL PHTHALATE.—2s. 9d. per lb.
EUGENOL.—9s. 3d. per lb.
GERANIOL (PALMAROSA).—17s. per lb.
GERANIOL.—7s. 6d. to 10s. per lb.
HELIOTROPINE.—6s. per lb.
ISO EUGENOL.—11s. 6d. per lb.
PHENYL ETHYL ACETATE.—11s. per lb.
PHENYL ETHYL ALCOHOL.—9s. per lb.
RHODINOL.—46s. per lb.
SAFROL.—2s. per lb.
TERPINEOL.—1s. 6d. per lb.
VANILLIN, EX CLOVE OIL.—13s. 6d. to 15s. per lb. Ex Guaiacol. 12s. 6d. to 13s. 9d. per lb.

## Essential Oils

ALMOND OIL.—Foreign S.P.A., 10s. per lb.
ANISE OIL.—No supplies available on spot.
BERGAMOT OIL.—10s. per lb.
BOURBON GERANIUM OIL.—21s. per lb.
CAMPHOR.—Brown, 1s. 9d. per lb.
CANANGA.—Java, 9s. per lb.
CASSIA OIL, 80/85%.—4s. 6d. per lb.
CINNAMON OIL LEAF.—6s. 9d. per oz.
CITRONELLA OIL.—Java, 2s. 5d. per lb., pure, Ceylon, 2s. 3d. per lb., c.i.f. U.K. port.
LAVENDER OIL.—Mont Blanc, 38/40%, 10s. 6d. per lb.
PEPPERMINT OIL.—English, 55s. per lb.; Wayne Cty., 12s. per lb.

# London Chemical Market

***The following notes on the London Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.***

*London, September 4, 1930.*

THERE is little change to report since last week, and prices are steady without any great alteration. There is a fair amount of inquiry being received from consumers for forward delivery and also on export account.

## General Chemicals

ACETONE.—There has been a steady call for this product, mainly on contract account, and price is firm at £71 10s. to £80 per ton, according to quantity.

ACID ACETIC.—Unchanged, and there is a steady demand at £36 5s. to £38 5s. per ton for technical 80%, and £37 5s. to £39 5s. for pure 80%, according to quantity, delivered buyers' works.

ACID CITRIC.—Business continues rather slow, but price is now steady at about 1s. 6½d. per lb., less 5%.

ACID LACTIC.—Rather more business has been offering with the price steady at £41 to £42 per ton for 50% by weight, pale quality.

ACID OXALIC.—A steady call, and prices are firm at £30 7s. 6d. to £32 per ton, according to quantity.

ACID TARTARIC.—Price shows little change at about 1s. 1d. per lb., less 5%, and the slight improvement in the demand is continued.

ALUMINA SULPHATE.—Business is of a satisfactory nature and price is unchanged at £8 to £8 15s. per ton for 17/18% iron free quality.

ARSENIC.—Business has been much brighter in this product than for some little time, and price is firm at about £16 per ton, f.o.r. at the mines.

CREAM OF TARTAR.—Continues inactive and is unchanged at 88s. to 90s. per cwt., ex warehouse London.

COPPER SULPHATE.—There has been a fair inquiry for early delivery and price is unchanged at £21 to £22 per ton, f.o.r. London.

FORMALDEHYDE.—Business continues satisfactory, and price is steady at £32 per ton, ex wharf London.

LEAD ACETATE.—Inquiry has been a little better, brown material being quoted at about £39 per ton, with white in rather better request at £40 per ton.

LEAD NITRATE.—Steady at £29 10s. to £30 per ton.

LITHOPONE.—Prices are unchanged at £19 15s. to £23 per ton, according to grade, with a fairly satisfactory demand.

CARBONATE OF POTASH.—In fair request at £28 to £29 per ton for 96/98% arsenic free quality.

PERMANGANATE OF POTASH.—In steady request at about 5½d. per lb. for B.P. needle crystals.

PRUSSIATE OF POTASH.—There has been a more active demand, and prices are firm at £63 10s. to £65 10s. per ton, according to quantity.

SODIUM BICHROMATE.—Unchanged and in good request at 3¾d. per lb., with usual discounts for contracts and in everyday demand.

SODIUM HYPOSULPHITE.—Photographic crystals continue in active request at about £14 15s. per ton, with commercial slow of sale at about £8 10s.

SULPHIDE OF SODA.—Unchanged at £10 5s. to £11 5s. per ton for solid, and £11 5s. to £12 5s. per ton for broken, according to quantity, carriage paid.

TARTAR EMETIC.—Unchanged at about 11d. per lb., and in steady demand.

ZINC SULPHATE.—In small request at about £12 10s. per ton.

## Coal Tar Products

The market for coal tar products remains unchanged. Prices are at the same level, but there is still a lack of inquiry.

MOTOR BENZOL.—Unchanged at about 1s. 5½d. to 1s. 6½d. per gallon, f.o.r.

SOLVENT NAPHTHA.—Quoted at about 1s. 2½d. to 1s. 3d. per gallon.

HEAVY NAPHTHA.—Remains at about 1s. 1d. per gallon, f.o.r.

CREOSOTE OIL.—Unchanged, at 3d. to 3½d. per gallon f.o.r. in the North, and at 4d. to 4½d. per gallon in London.

CRESYLIC ACID.—Remains at 2s. per gallon for the 98/100% quality, the dark quality 95/97% being quoted at 1s. 10d. per gallon.

NAPHTHALENES.—The firelighter grade is offered at £3 10s. to £3 15s. per ton, the 74/76 quality at about £4 to £4 5s. per ton, and the 76/78 quality at about £5 per ton.

PITCH.—Unchanged, at a nominal price of 37s. 6d. to 42s. 6d. per ton, f.o.b. East Coast port.

## Nitrogen Fertilisers

SULPHATE OF AMMONIA.—*Export.*—The market remains firm at £7 to £7 5s. per ton f.o.b. U.K. port for prompt shipment. Higher prices are quoted for forward positions. *Home.*—In the home market producers are offering at £8 19s. for September. The home demand continues negligible.

NITRATE OF SODA.—The Nitrate of Soda Producers' Association are basing their prices on those in operation last year. Although some of the larger buyers have booked quantities, in view of the general agricultural position it seems doubtful if the consumption will reach last year's level.

## Scottish Coal Tar Products

WITH the continued scarcity of orders for almost all tar products stocks are increasing and prices are easing. The tarring season is almost over, and the demand for pitch is not yet forthcoming.

*Cresylic Acid.*—While a few small orders have been placed, there is no change in the general position. Pale, 99/100%, 1s. 9½d. to 1s. 10½d. per gallon; pale, 97/99%, 1s. 8½d. to 1s. 9½d. per gallon; dark, 97/99%, 1s. 7½d. to 1s. 8½d. per gallon; high boiling, 1s. 9d. to 1s. 11d. per gallon, all f.o.r. naked.

*Carbolic Sixties.*—There is no business passing, and value is nominal at 2s. to 2s. 2d. per gallon.

*Creosote Oil.*—A limited demand exists for home trade, but the export position is unsatisfactory. Specification oil, 2¾d. to 3¼d. per gallon; gas works ordinary, 3d. to 3¼d. per gallon; washed oil, 3d. to 3½d. per gallon, all ex works.

*Coal Tar Pitch.*—Continental enquiries for shipment are late and price is nominal at 45s. to 47s. 6d. per ton f.a.s. Glasgow. Home value is about 47s. 6d. per ton f.o.r.

*Blast Furnace Pitch.*—Remains dull at fixed prices of 30s. per ton f.o.r. works for home trade, and 35s. per ton f.a.s. Glasgow for export.

*Refined Coal Tar.*—Delivery orders are slacking off and few new orders are being placed. Quotations are about 3d. to 3½d. per gallon ex works in buyers' packages.

*Blast Furnace Tar.*—Unchanged at 2¾d. per gallon f.o.r.

*Crude Naphtha.*—Production is on a small scale, and value is steady at 4d. to 4¼d. per gallon in bulk quantities f.o.r. works.

*Water White Products.*—Benzol continues to command some attention, and solvents are slightly better, although prices are unaltered. Motor benzol, 1s. 5½d. to 1s. 6d. per gallon; solvent naphtha, 90/160, 1s. 2½d. to 1s. 3½d. per gallon; heavy naphtha, 90/190, 1s. to 1s. 1d. per gallon, all free on rails works.

## South Wales By-Products

THERE is scarcely any change in South Wales by-product activities Pitch supplies continue to be well in excess of demand, and values remain nominal at about 47s. per ton f.o.b. Solvent naphtha has a fair call with values unchanged, but heavy naphtha has a slow market. Creosote is slightly better at about 3¾d. per gallon, while motor benzol has a fair and steady call round about 1s. 4½d. per gallon. Road tar has a moderate demand round about 13s. 6d. per 40-gallon barrel. Refined tars remain in good demand, with quotations for gasworks and coke oven tar unchanged. Patent fuel and coke exports remain unsatisfactory, but there are indications that an improvement is imminent.

## Latest Oil Prices

LONDON, September 3.—LINSEED OIL closed steady, 2s. 6d. higher to unchanged forward. Spot, ex mill, £32; September, £29 15s.; September-December, £29 2s. 6d.; January-April, £28, naked. RAPE OIL was inactive. Crude extracted, £34; technical refined, £35 10s., naked, ex wharf. COTTON OIL was dull. Egyptian crude, £27; refined common edible, £32 10s.; deodorized, £34, naked, ex mill. TURPENTINE was quiet and unchanged. American, spot, 36s. 6d.; October-December, 37s.; January-April, 38s. 9d. per cwt.

HULL.—LINSEED OIL, naked, spot, £32; September, £30 15s.; October-December, £30; January-April, £29. COTTON OIL, naked, Egyptian crude, spot, £26; edible refined, spot, £29 15s.; technical, spot, £29 10s.; deodorized, spot, £31 15s. PALM KERNEL OIL.—Crude naked, 5½ per cent., spot, £26 10s. GROUNDNUT OIL.—Crushed/extracted, spot, £30 10s.; deodorized, spot, £34 10s. SOYA OIL.—Extracted and crushed, spot, £27 10s.; deodorized, spot, £31. RAPE OIL.—Crushed/extracted, spot, £34 10s.; refined, spot, £36 10s. per ton. TURPENTINE, spot, 39s. per cwt. CASTOR and COD OIL.—Unchanged. Net cash terms ex mill.

# Scottish Chemical Market

*The following notes on the Scottish Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing this firm's independent and impartial opinions.*

*Glasgow, September 2, 1930.*

THE past week has shown no improvement in the Scottish heavy chemical market. Enquiries both for home and export business are very poor. Prices still remain unchanged.

### Industrial Chemicals

ACETONE B.G.S.—£71 10s. to £80 per ton, ex wharf, according to quantity. Inquiry remains satisfactory.

ACID ACETIC.—Prices ruling are as follows:—Glacial 98/100%, £47 to £58 per ton; pure, £37 5s. per ton; technical 80%, £36 5s. delivered in minimum 1 ton lots.

ACID BORIC.—Granulated, commercial, £22 per ton; crystals, £23; B.P. crystals, £31 per ton; powder, £32 per ton, in 1 cwt. bags delivered free, Great Britain, in 1 ton lots and upwards.

ACID HYDROCHLORIC.—Usual steady demand. Arsenical quality, 4s. per carboy. Dearsenicated quality, 5s. per carboy, ex works, full wagon loads.

ACID NITRIC 80° quality.—£23 per ton, ex station, full truck loads.

ACID OXALIC 98/100%.—On offer at the same price, viz., 3¼d. per lb., ex store. Offered from the Continent at 3⅛d. per lb., ex wharf.

ACID SULPHURIC.—£3 2s. 6d. per ton, ex works, for 144° quality; £5 15s. per ton for 168°. Dearsenicated quality, 20s. per ton extra.

ACID TARTARIC B.P. CRYSTALS.—Quoted 1s. 1d. per lb., less 5% ex wharf. On offer for prompt delivery from the Continent at 1s. 2⅛d. per lb., less 5% ex wharf.

ALUMINA SULPHATE.—Quoted at round about £8 15s. per ton, ex store.

ALUM, LUMP POTASH.—Now quoted £8 7s. 6d. per ton, c.i.f. U.K. ports. Crystal meal, about 2s. 6d. per ton less.

AMMONIA ANHYDROUS.—Quoted 10½d. per lb., containers extra and returnable.

AMMONIA CARBONATE.—Lump quality quoted £36 per ton; powdered, £38 per ton, packed in 5 cwt. casks, delivered U.K. stations or f.o.b. U.K. ports.

AMMONIA LIQUID 80°.—Unchanged at about 2⅛d. to 3d. per lb., delivered, according to quantity.

AMMONIA MURIATE.—Grey galvanisers' crystals of British manufacture quoted £21 to £22 per ton, ex station. Fine white crystals offered from the Continent at about £17 5s. per ton, c.i.f. U.K. ports.

ANTIMONY OXIDE.—Spot material obtainable at round about £30 per ton, ex wharf. On offer for shipment from China at about £27 per ton, c.i.f. U.K. ports.

ARSENIC, WHITE POWDERED.—Quoted £18 per ton, ex wharf, prompt shipment from mines. Spot material still on offer at £19 15s. per ton, ex store.

BARIUM CHLORIDE.—In good demand and price about £11 per ton, c.i.f. U.K. ports. For Continental material our price would be £10 per ton, f.o.b. Antwerp or Rotterdam.

BLEACHING POWDER.—British manufacturers' contract price to consumers unchanged at £6 15s. per ton, delivered in minimum 4-ton lots. Continental now offered at about the same figure.

CALCIUM CHLORIDE.—Remains unchanged. British manufacturers' price, £4 15s. per ton to £5 5s. per ton, according to quantity and point of delivery. Continental material on offer at £4 15s. per ton, c.i.f. U.K. ports.

COPPERAS GREEN.—At about £3 15s. per ton, f.o.r. works or £4 12s. 6d. per ton, f.o.b. U.K. ports.

FORMALDEHYDE 40%.—Now quoted £33 per ton, ex store. Continental material on offer at about £32 per ton, ex wharf.

GLAUBER SALTS.—English material quoted £4 10s. per ton, ex station. Continental on offer at about £3 per ton, ex wharf.

LEAD, RED.—Price now £33 per ton, delivered buyers' works.

LEAD, WHITE.—Quoted £46 per ton, c.i.f. U.K. ports.

LEAD, ACETATE.—White crystals quoted round about £39 to £40 per ton, ex wharf. Brown on offer at about £2 per ton less.

MAGNESITE, GROUND CALCINED.—Quoted £9 per ton, ex store. In moderate demand.

METHYLATED SPIRIT.—Industrial quality, 64 O.P., quoted 1s. 8d. per gallon, less 2½% delivered.

POTASSIUM BICHROMATE.—Quoted 4½d. per lb., delivered U.K. or c.i.f. Irish ports, with an allowance for contracts.

POTASSIUM CARBONATE.—Spot material on offer at £26 10s. per ton, ex store, offered from the Continent at £25 5s. per ton, c.i.f. U.K. ports.

POTASSIUM CHLORATE, 99¾/100%—POWDER, Quoted £26 5s. per ton, ex store; crystals, 30s. per ton extra.

POTASSIUM NITRATE.—Refined granulated quality quoted £20 17s. 6d. per ton, c.i.f. U.K. ports. Spot material on offer at about £20 10s. per ton, ex store.

POTASSIUM PERMANGANATE B.P. CRYSTALS.—Quoted 5d. per lb., ex wharf.

POTASSIUM PRUSSIATE (YELLOW).—Spot material quoted 7d. per lb., ex store. Offered for prompt delivery from the Continent at about 6¾d. per lb., ex wharf.

SODA, CAUSTIC.—Powdered 98/99%, £17 10s. per ton, in drums, £18 15s. per ton in casks. Solid 76/77% £14 10s. per ton in drums, £14 12s. 6d. per ton for 70/72% in drums, all carriage paid buyers' station. Minimum 4-ton lots. For contracts 10s. per ton less.

SODIUM BICARBONATE.—Refined recrystallised £10 10s. per ton, ex quay or station. M.W. quality 30s. per ton less.

SODIUM BICHROMATE.—Quoted 3⅞d. per lb. delivered buyers' premises, with concession for contracts.

SODIUM CARBONATE (SODA CRYSTALS).—£5 to £5 5s. per ton, ex quay or station. Powdered or pea quality 27s. 6d. per ton extra. Light soda ash £7 13s. per ton, ex quay, minimum 4-ton lots, with various reductions for contracts.

SODIUM HYPOSULPHITE.—Large crystals of English manufacture quoted £8 17s. 6d. per ton, ex station, minimum 4-ton lots. Pea crystals on offer at £14 15s. per ton, ex station, minimum 4-ton lots.

SODIUM NITRATE.—Chilean producers now offer at £10 2s. per ton, carriage paid buyers' sidings, minimum 6-ton lots, but demand in the meantime is small.

SODIUM PRUSSIATE.—Quoted 5¼d. per lb., ex store. On offer at 5d. per lb., ex wharf, to come forward.

SODIUM SULPHATE (SALTCAKE).—Prices 55s. per ton, ex works, 57s. 6d. per ton delivered, for unground quality. Ground quality 2s. 6d. per ton extra.

SODIUM SULPHIDE.—Prices for home consumption: solid 61/62%, £10 broken per ton, 60/62%, £11 per ton. Crystals 30/32%, £8 2s. 6d. per ton, all delivered buyers' works on contract minimum 4-ton lots. Special prices for some consumers. Spot material, 5s. per ton extra. Crystals, 2s. 6d. per ton extra.

SULPHUR.—Flowers, £12 per ton; Roll, £10 10s. per ton; rock, £9 5s. per ton; ground American, £9 5s. per ton, ex store.

ZINC CHLORIDE 98%.—British material now offered at round about £20 per ton f.o.b. U.K. ports.

ZINC SULPHATE.—Quoted £12 per ton, ex wharf.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

## "From Alchemy to Bio-chemistry"

"THE Development of Chemistry from Alchemy to Bio-chemistry" was the subject of a paper read by Mr. H. R. Hardie, of London, at the annual conference of the Pathological and Bacteriological Laboratory Assistants' Association at Manchester University last week. Bio-chemistry, he said, was not a recent off-shoot of the parent stem of chemical science. Its history could be traced a long way back. Van Helmont, who lived from 1577 to 1644, might be said to have started "physiological" chemistry by insisting upon the study of the reactions and secretions of the body. Modern methods of work in bio-chemistry often involved an appalling degree of accuracy, and he was sometimes tempted to think he would give bio-chemistry up for the less exact science of bacteriology. However, it was too fascinating to be lightly relinquished.

## Laboratory Sifting Investigator

CHRISTY AND NORRIS, LTD., of Chelmsford, have recently put on the market a sifting investigator specially designed for sifting small quantities of materials for laboratory and other tests for fineness. The machine is very compact, being 4 in. in diameter, and it is entirely self-contained. Provision is made for a full range of sieves when not in use, to be enclosed inside the frame, and there is thus no fear of the spare sieves being misplaced or lost. An advantage of this investigator is that sieves of practically any fineness can be used as the frame is arranged to take one sieve at a time, held in place by a spring clip, while the sifted material falls into the receptacle underneath. When another fineness is required, all that is necessary is to remove the spring clip, take out the circular sieve and replace with one of the desired size. Sieves can be supplied in silk, steel wire, phosphor-bronze or brass wire.

# Manchester Chemical Market

(From Our Own Correspondent.)

*Manchester, September 4, 1930.*

Although in one or two markets locally rather more business has been met with during the past week, the improvement in this respect has not yet penetrated to any appreciable extent to the chemical market so far as actual bookings are concerned. Hope of some degree of expansion within the next week or two is, however, strong, and already in several quarters a slight increase in the volume of inquiry has been reported. From the point of view of prices, the general position has not altered much on the week, but the tone is reasonably steady all round and there has not been much evidence this week of the weakness recently noted in several sections.

### Heavy Chemicals

Hyposulphite of soda is well held, with the demand at the moment on a moderate scale, ; the photographic quality is offering at about £15 per ton and the commercial material at from £9 to £9 10s. Prussiate of soda meets with a quietly steady call and prices keep up at from 4¾d. to 5¼d. per lb., according to quantity. There is a fair inquiry about in the case of alkali, which is firm at about £6 per ton, with bicarbonate of soda in a somewhat similar position at £10 10s. Caustic soda is moving off in fair quantities, chiefly against contract commitments, these being on the basis of from £12 15s. to £14 per ton, according to quality. There is only a quiet trade going through in the case of saltcake but prices keep up at from £2 15s. to £3 per ton. Bichromate of soda meets with a fair amount of inquiry, with prices well held on the basis of 3⅜d. per lb., less 1 to 3½ per cent. Sulphide of sodium during the past week has been in rather restricted demand, with the 60/65 per cent. concentrated solid product quoted at from £8 10s. to £9 per ton, and the commercial kind at round £7 15s. Chlorate of soda is not particularly active just now, but values in this section are much the same as a week ago, the range being from about £24 to £24 10s. per ton. Phosphate of soda is quiet but steady, with the dibasic quality current quoted at about £11 per ton.

Offers of carbonate of potash this week have been down to about £24 10s. per ton, with buying interest on quiet lines. A very maderate business is going through in the case of permanganate of potash but values are steady at round 5½d. per lb. for the B.P. quality and 5¼d. for the commercial. Caustic potash is quiet at the moment, but at about £30 per ton prices are much the same as before. Yellow prussiate of potash is firm and in fair request at from 6¾d. to 7¼d. per lb., according to quantity. Only a quiet business is passing in chlorate of potash, offers of which are from about £25 10s. to £26 per ton. Bichromate of potash meets with a moderately good demand and prices are well held on the basis of 4⅛d. per lb.

A moderate demand is reported in respect of arsenic, current offers of which are up to £16 per ton at the mines, for white powdered, Cornish makes. Sulphate of copper is about unchanged on balance at from £22 per ton, f.o.b., but the demand for this material is not too active. Only a quiet trade is going through in the lead products but there has been no further change in values, nitrate being on offer at about £29 10s. per ton and white and brown acetate at £36 and £35. Acetate of lime is reasonably steady at round £7 15s. per ton for the brown quality and £14 10s. for the grey, only limited sales being made.

### Acids and Tar Products

In the acid section, oxalic keeps up at £1 12s. per cwt., ex store, a moderate trade being put through. Tartaric acid is in rather quiet demand at about 1s. per lb., as is also citric acid at from 1s. 6d. to 1s. 6¼d. per lb. There is a fair demand about for acetic acid, quotations for which are maintained at about £37 per ton for the 80 per cent. commercial quality, and from £47 to £51 for the glacial.

Export inquiry for pitch this week has been on moderate lines, with 47s. 6d. per ton, f.o.b., still being indicated. Creosote oil is in quiet demand both for home use and for shipment, but prices are steady at from 3¼d. to 4¼d. per gallon, naked, at works. Carbolic acid crystals are in fair request at from 6¼d. to 7¼d. per lb., f.o.b., with crude obtainable to-day at about 2s. 1d. per gallon, f.o.b. Solvent naphtha is moderately active at round 1s. 2d. per gallon, naked.

# New Chemical Trade Marks

### Applications for Registration

*These lists are specially compiled for us from official sources by Gee and Co., Patent and Trade Mark Agents, Staple House, 51 and 52, Chancery Lane, London, W.C.2, from whom further information may be obtained, and to whom we have arranged to refer any inquiries relating to Patents, Trade Marks and Designs.*

*Opposition to the Registration of the following Trade Marks can be lodged up to September 27, 1930.*

Vulcatex.

514,716. Class 1. Chemical substances used in manufactures, photography, or philosophical research, and anti-corrosives. British Dyestuffs Corporation, Ltd., Hexagon House, Blackley, Manchester; manufacturers. July 19, 1930. To be associated with 440,881. (2,382.)

Calatex.

514,717. Class 1. Chemical substances used in manufactures, photopgraphy, or philosophical research, and anti-corrosives. British Dyestuffs Corporation, Ltd., Hexagon House, Blackley, Manchester; manufacturers. July 19, 1930. To be associated with 514,718 (2,735) iv.

Mutonit.

514,186. Class 2. Chemical substances used for purifying and sterilising water and other liquids. Naamlooze Vennootschap Standard Water Maatschappij (a joint stock company organised under the laws of Holland), 216, Amstel, Amsterdam, Holland; manufacturers. July 1, 1930.

Vivomin.

513,511. Class 3. Chemical substances in the form of colloidal metals prepared for use in medicine and pharmacy. British Colloids, Ltd., 22, Chenies Street, Tottenham Court Road, London, W.C.1; manufacturers. June 4, 1930.

# Chemical Trade Inquiries

*The following inquiries, abstracted from the "Board of Trade Journal" have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.*

Argentina.—The Argentine State Railways are calling for tenders, to be presented in Buenos Aires by October 13, 1930, for the supply of laboratory testing machines and apparatus. Reference No. A.X. 10,149.

Belgium.—An agent, established at Brussels, is desirous of securing the sole representation of British exporters of vegetable oils for soap making. (Reference No. 211.)

# Tariff Changes

Roumania.—The duty on imported citric and tartaric acid will be reduced from 4,000 to 2,500 lei per 100 kilogs. when the new Treaty of Commerce and Navigation comes into operation.

Basutoland, Bechuanaland and Swaziland.—A Proclamation of the Governor-General of South Africa has extended as from July 1 all the provisions of the Food, Drugs and Disinfectants Act of the Union to any article imported through any place in the Union and intended for Basutoland, the Bechuanaland Protectorate or Swaziland.

### French Nitric Acid Production

Until 1928, when synthetic nitric acid production was started locally, France imported about one-third of the requirements of this product. In 1929, practically all of the 25,000 tons consumed was from home production, when six units with a monthly capacity of 600 metric tons per unit were operating. The total annual nitric acid capacity is to be augmented to about 50,000 tons by a seventh plant under construction. French nitric acid installations are set up with a view of producing calcium nitrate, for which equipment is being installed in some of the plants in the north.—U.S.A. Commercial Attaché, Paris.

## High Temperature Steam

### The Valve of the Single-pass Principles for Superheating

THE rapidly growing tendency to the adoption of high steam pressure and superheated steam temperatures, over 750° Fahr., both in power station and in industrial practice, was one of the points emphasised in the recent paper by H. S. Humphrey, D. M. Buist and J. W. Bansall before the Institution of Electrical Engineers. This gives a detailed description of the boiler and power plant of Synthetic Ammonia and Nitrates, Ltd., at Billingham, with steam generating equipment of eight forged drum "Lopulco" boilers, in two groups of four boilers, operating under maximum conditions of 800 lb. per square inch pressure and 855° Fahr. superheated steam temperature. The superheater installation is of the single-pass multiple-loop type, supplied by the Superheater Co., Ltd., of London and Trafford Park, Manchester, and to provide the steam velocity essential for such very high duty elements a drop in pressure is allowed through the superheaters of 40 lb. per square inch, the normal conditions at the turbine stop valve being 645 lb. and 833° Fahr.

Correct design and the single-pass principle of construction, with special care in the selection of materials, have shown that superheating can be carried out safely at 750°–850° Fahr., using high grade low carbon steel, and a considerable number of such plants, both in power stations and industrial establishments, are already operating in Great Britain and elsewhere.

At Billingham the superheaters are suspended between the boiler tubes, partly exposed to the radiant heat of the furnace, with the weight taken entirely by the structure and not by any part of the boiler under pressure. Each boiler has four separate headers outside the setting, two for the saturated steam inlet and two for the superheated steam outlet, bored from solid mild steel forgings, while the approximate length of the travel in each of the multiple loop elements is about 200 feet.

The "M.L.S." superheater is also well known in marine work and locomotive work, where the same tendency to higher steam pressure and temperatures is now a prominent feature, and it is interesting to note that separately fired superheaters of this make are operating for low temperature carbonisation at temperatures of 900–1,200° Fahr. on the "Turner" semi-hydrogenation plant at Coalburn (Lanarkshire), and the "K.S.G." plant at the South Metropolitan Gas Works, London.

## New Rhodesian Fertiliser Factory

THE new Rodia fertiliser factory of the African Explosives and Industries (Ltd.), at Msasa, Southern Rhodesia, has recently been opened for operation. In view of the possibility of the erection of a superphosphate factory, with complementary acid plants, the present structure has been modelled after the most up-to-date superphosphate works. The factory consists of a main building, which houses the mixing and bagging units, and also provides storage space for all necessary raw materials and mixed fertilisers up to 10,000 tons. The new factory should meet the total fertiliser requirements of the two Rhodesias for some time to come. The mixing plant will turn out about 200 tons per day, while the bagging units will be able to handle about 150 tons per day. The bone plant is the first of its kind in Southern Africa, and has a capacity of 20 tons a day. The raw bones for use in the plant are to be collected from all sections of the Rhodesias.

### German Cyanamide Works

BAYERISCHE STICKSTOFFWERKE A.G., in its annual report for 1929, states that its cyanamide-carbide works at Trostberg-Tachterting, the subsidiary Bayerische Kraftwerke works at Hart, and the leased Piesteritz cyanamide plant operated at Mitteldeutsche Stickstoff were fully engaged. The Bayerische Stickstoffwerke operates experiment farms on the Schleissheim and "Auf der Huell" estates to demonstrate the beneficial effects of cyanamide, particularly its weed and pest-destroying properties. These farms are administered by the so-called "Stickstoffland G.m.b.H." Another subsidiary, Donauwerke A.G. fuer Kalkindustrie, increased its sales of limestone and effected plant improvements.

# Commercial Intelligence

*The following are taken from printed reports, but we cannot be responsible for any errors that may occur.*

## Mortgages and Charges

[*NOTE.—The Companies Consolidation Act of* 1908 *provides that every Mortgage or Charge, as described therein, shall be registered within* 21 *days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debt due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

HUGHES (J. M.), LTD., High Wycombe, manufacturing chemists. (M., 6/9/30.) Registered August 25, £600 charge, to Mrs. A. Towerton, 2, Ash Grove, Bush Hill Grove, Enfield; charged on 102, London Road, High Wycombe. *——. July 24, 1930.

PETROL, LTD., London, E.C. (M., 6/9/30.) Registered August 11, Land Registry charge securing £75,000 (advance to London Trading Estates, Ltd.), to Friends' Provident and Century Life Office, 7, Leadenhall Street, E.C.; charged on 97, Peckham Road, Camberwell, etc. *£1,400. December 20, 1929.

### Satisfaction

PETROL, LTD., London, E.C. (M.S., 6/9/30.) Satisfaction registered August 26, £1,500 (not exceeding), registered August 12, 1926, and £1,500 (not exceeding), registered February 12, 1927.

SABULITE (GREAT BRITAIN), LTD., London, E.C., explosive manufacturers. (M.S., 6/9/30.) Satisfaction registered August 23, £5,000, registered November 2, 1926.

TAYLORS (CASH CHEMISTS) MIDLAND, LTD., Birmingham. (M.S., 6/9/30.) Satisfaction registered August 25, £550, part of amount registered February 6, 1930.

## Receivership

CHROMO PROCESS SYNDICATE, LTD. (R., 6/9/30.) J. Parker, Chartered Secretary, of 16, John Street, Adelphi, W.C.2, was appointed receiver and manager on August 18, 1930, under powers contained in debenture dated May 8, 1930.

## London Gazette, &c.

### Winding-Up Petition

BRITISH SULPHIDES SMELTING CO., LTD. (W.U.P., 6/9/30.) A petition for winding-up has been presented and is to be heard at the Royal Courts of Justice, London, on October 14.

### Companies Winding Up Voluntarily

BRITISH AMMONIUM CO., LTD. (C.W.U.V., 6/9/30.) By reason of its liabilities, August 27. P. R. R. S. Storrey, Chartered Accountant, of Victoria Chambers, Long Eaton, appointed as liquidator.

FITZ (ARCHD. J.), LTD. (C.W.U.V., 6/9/30.) Statutory meeting of creditors at the offices of W. Lacon Threlford and Co., 28a, Basinghall Street, E.C.2, on Saturday, September 6, 1930, at 11.30. a.m.

PALATINE CHEMICAL CO., LTD. (Members' Voluntary Winding-up.) Creditors' claims to be sent to the liquidator, J. W. Westhead, of 6, Birley Street, Blackpool, Chartered Accountant, by September 25.

### Notice of Dividend

KAY, Charles, 341, Bury Road, Tottington, Lancs, gasworks chemist. Supplemental dividend of 2$\frac{7}{16}$d. per £, payable September 8, Official Receiver's Offices, Byrom Street, Manchester.

## New Companies Registered

CONTINENTAL CHEMICAL CORPORATION, LTD.—Registered August 31. Nominal capital, £5 in 1s. shares. To acquire the business of a manufacturer and inventor of chemical products carried on by Leo. G. Culleton, together with the formulæ, chemical receipts, processes, rights and other assets, etc. A subscriber: Miss Ellen G. George, 49, The Grove, Wandsworth Common, London, S.W.18. Directors: Fanny Culleton and Leo G. Culleton.